PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2004-107326

(43)Date of publication of application : 08.04.2004

(51)Int.Cl. C07C 13/567
C07C 13/66
C07C 15/56
C07C 15/58
C07C 15/60
C07C 15/62
C07C 25/22
C07C211/58
C07C255/52
C07D219/02
C07D401/14
C07D471/04
C09K 11/06
H05B 33/14
H05B 33/22

(21)Application number : 2003-291191

(22)Date of filing : 11.08.2003

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(30)Priority

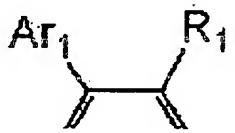
Priority number : 2002246600 Priority date : 27.08.2002 Priority country : JP

(54) CONDENSED POLYCYCLIC COMPOUND AND ORGANIC LIGHT-EMITTING ELEMENT BY USING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a new condensed polycyclic compound and an organic light-emitting element having light output with an extremely high efficiency and high luminances and also having an extreme durability by using the same.

SOLUTION: This condensed polycyclic compound is expressed by



general formula [I] (wherein, R1 is H, a substituted or non-substituted alkyl, a substituted or non-substituted aralkyl, a substituted or non-substituted aryl, a substituted or non-substituted heterocyclic group, a substituted amino, cyano or a halogen atom; and Ar1 to Ar5 are each a substituted or non-substituted condensed polycyclic aromatic group, or a substituted or non-substituted condensed polyheterocyclic group and allowed to be the same or different). The compound is used as an electron-transporting layer or a light-emitting layer of the organic light-emitting element.

LEGAL STATUS

[Date of request for examination]	08.06.2006
[Date of sending the examiner's decision of rejection]	
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	
[Date of registration]	
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

* NOTICES *

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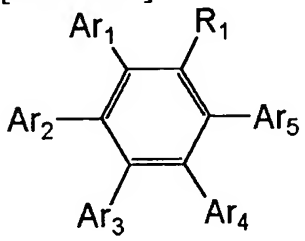
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

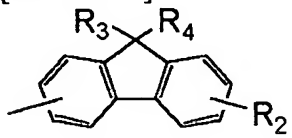
CLAIMS

[Claim(s)]
[Claim 1]
The condensed multi-ring compound characterized by what is shown by the following general formula [I].
[Formula 1]



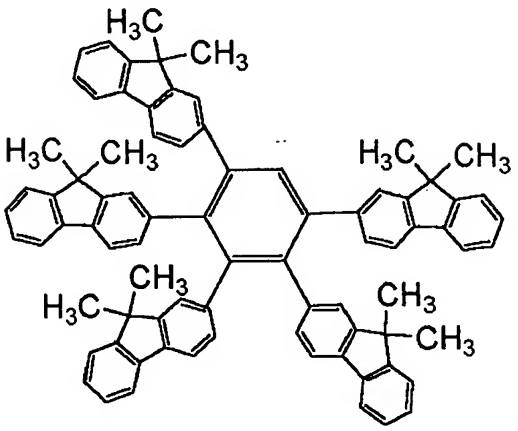
[I]

(R1 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, a cyano group, or a halogen atom.) Ar1-Ar5 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or], and even if the same, they may differ.
[Claim 2]
The condensed multi-ring compound according to claim 1 characterized by at least one of Ar1-Ar5 being the condensed multi-ring aromatic series radical shown by the following general formula [III].
[Formula 2]

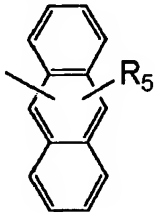


[I I I]

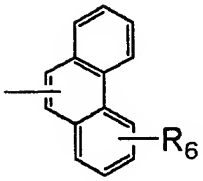
(R2 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, a cyano group, or a halogen atom.) R3 and R4 express the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], and even if the same, they may differ.
[Claim 3]
The condensed multi-ring compound according to claim 2 characterized by what is shown by the following structure expression.
[Formula 3]



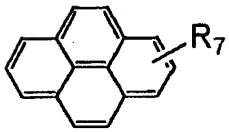
[Claim 4]
The condensed multi-ring compound according to claim 1 characterized by at least one of Ar1-Ar5 being the condensed multi-ring aromatic series radical shown by either following general formula [IV] - [VII].
[Formula 4]



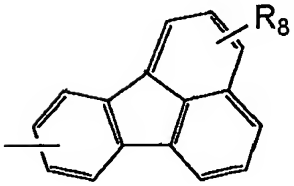
[IV]



[V]



[VI]



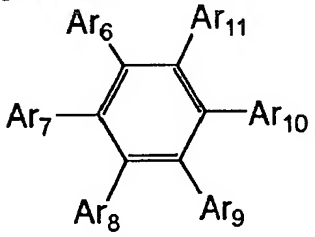
[VII]

(R5-R8 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, a cyano group, or a halogen atom.)

[Claim 5]

The condensed multi-ring compound characterized by what is shown by the following general formula [II].

[Formula 5]



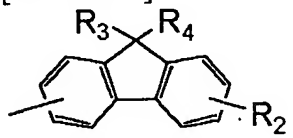
[I I]

(Among the formula, Ar6-Ar11 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or], and even if the same, they may differ.)

[Claim 6]

The condensed multi-ring compound according to claim 5 characterized by at least one of Ar6-Ar11 being the condensed multi-ring aromatic series radical shown by the following general formula [III].

[Formula 6]



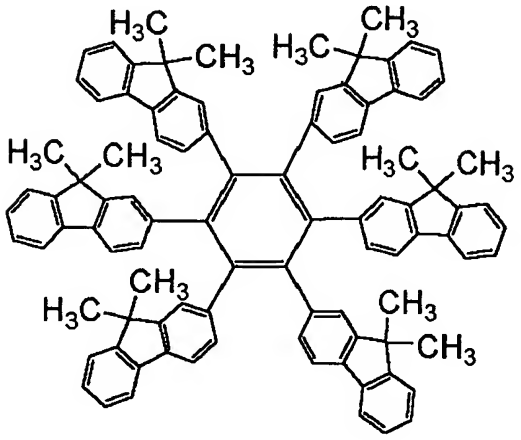
[I I I]

(R2 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, a cyano group, or a halogen atom.) R3 and R4 express the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], and even if the same, they may differ.

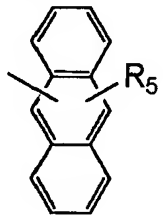
[Claim 7]

The condensed multi-ring compound according to claim 6 characterized by what is shown by the following structure expression.

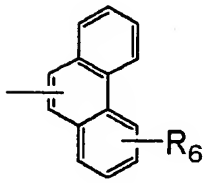
[Formula 7]



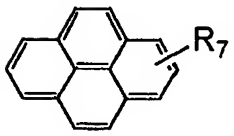
[Claim 8]
The condensed multi-ring compound according to claim 5 characterized by at least one of Ar1-Ar5 being the condensed multi-ring aromatic series radical shown by either following general formula [IV] - [VII].
[Formula 8]



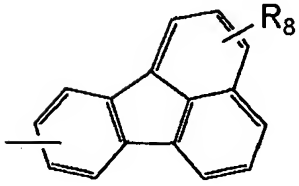
[I V]



[V]



[V I]



[V I I]

(R5-R8 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, a cyano group, or a halogen atom.)

[Claim 9]

The organic light emitting device to which at least one layer of the layers containing said organic compound is characterized by the thing of one of condensed multi-ring compounds according to claim 1 to 4 for which a kind is contained at least in the organic light emitting device which has at least a layer containing the electrode of a couple which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this couple].

[Claim 10]

The organic light emitting device to which at least one layer of the layers containing said organic compound is characterized by the thing of one of condensed multi-ring compounds according to claim 5 to 8 for which a kind is contained at least in the organic light emitting device which has at least a layer containing the electrode of a couple which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this couple].

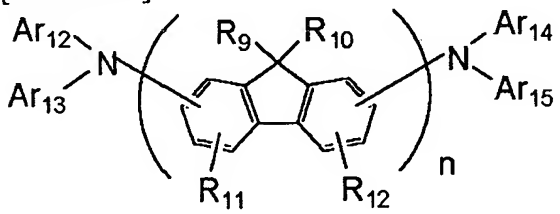
[Claim 11]

The organic light emitting device according to claim 9 or 10 to which an electronic transporting bed or a luminous layer is characterized by the thing of said condensed multi-ring compound for which a kind is contained at least at least among the layers containing said organic compound.

[Claim 12]

The organic light emitting device according to claim 9 or 10 to which a luminous layer is characterized by containing the fluorene compound of said condensed multi-ring compound indicated to be a kind by the following general formula [VIII] at least at least among the layers containing said organic compound.

[Formula 9]



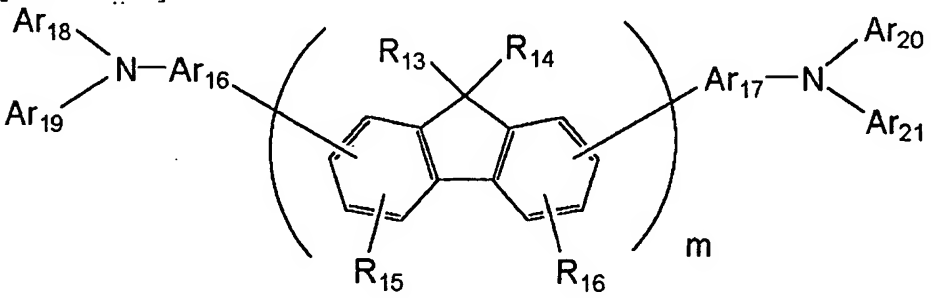
[V I I I]

(Even if R9 and R10 which may differ from each other even if R9 comrades and R10 comrades which R9 and R10 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], and are combined with a different fluorene radical are the same, and are combined with the same fluorene radical are the same, they may differ.) R11 and R12 express the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], a cyano group, or a halogen atom. Even if R11 and R12 which may differ from each other even if R11 comrades and R12 comrades which are combined with a different fluorene radical are the same, and are combined with the same fluorene radical are the same, they may differ. Ar12, Ar13, Ar14, and Ar15 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / the heterocycle radical which is not permuted / the aromatic series radical which is not permuted / a permutation or / a permutation, or / a permutation, or /, a permutation, or], and even if the same, they may differ. It may join together mutually and Ar12, and Ar13, Ar14 and Ar15 may form a ring. n expresses the integer of 1 thru/or 10.

[Claim 13]

The organic light emitting device according to claim 9 or 10 to which a luminous layer is characterized by containing the fluorene compound of said condensed multi-ring compound indicated to be a kind by the following general formula [IX] at least at least among the layers containing said organic compound.

[Formula 10]



[I X]

(Even if R13 and R14 which may differ from each other even if R13 comrades and R14 comrades which R13 and R14 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], and are combined with a different fluorene radical are the same, and are combined with the same fluorene radical are the same, they may differ.) R15 and R16 express the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], a cyano group, or a halogen atom. Even if R15 and R16 which may differ from each other even if R15 comrades and R16 comrades which are combined with a different fluorene radical are the same, and are combined with the same fluorene radical are the same, they may differ. Ar16 and Ar17 express the heterocycle radical which is not permuted [the aromatic series radical which is not permuted / a divalent permutation or /, a permutation, or], and even if the same, they may differ. Ar18, Ar19, Ar20, and Ar21 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / the heterocycle radical which is not permuted / the aromatic series radical which is not permuted / a permutation or / a permutation, or / a permutation, or /, a permutation, or], and even if the same, they may differ. It may join together mutually and Ar18, and Ar19, Ar20 and Ar21 may form a ring. m expresses the integer of 1 thru/or 10.

[Translation done.]

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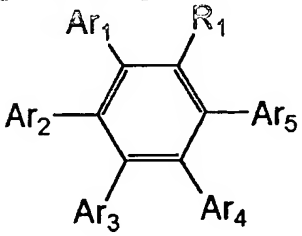
DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
This invention relates to the organic light emitting device using a new organic compound and new it.
[Background of the Invention]
[0002]
An organic light emitting device is a component using the light emitted in case the exciton of a fluorescence compound or a phosphorescence compound is made to generate and this exciton returns to a ground state by making the thin film containing a fluorescence organic compound or a phosphorescence organic compound pinch, and pouring in an electron and a hole (electron hole) from each electrode between an anode plate and cathode.
[0003]
In research (nonpatent literature 1) of KODAKKU, ITO is used for an anode plate, the alloy of magnesium silver will be used for cathode in 1987, respectively, and luminescence of about [1000cds //m] two is reported by the component of the functional discrete-type two-layer configuration which used the triphenylamine derivative for the hole transport ingredient in about [10V] applied voltage, using an aluminum quinolinol complex as an electronic transport ingredient and a luminescent material. As a patent of relation, the patent reference 1 - 3 grades are mentioned.
[0004]
Moreover, by changing the class of fluorescence organic compound, luminescence from ultraviolet to infrared rays is possible, and, recently, research of various compounds is done actively. For example, it is indicated by the patent reference 4 - 11 grades.
[0005]
In recent years, many examination which uses the energy of a triplet state for EL luminescence is made, using a phosphorescence compound as a luminescent material. It is reported by the group of Princeton University that the organic light emitting device using the iridium complex as a luminescent material shows high luminous efficiency (nonpatent literature 2).
[0006]
Furthermore, the organic light emitting device which used the conjugated-system giant molecule other than an organic light emitting device using the above low-molecular ingredients is reported by the group (nonpatent literature 3) of Cambridge University. By this report, luminescence is checked by the monolayer by forming polyphenylene vinylene (PPV) by the coating system.
[0007]
As a related patent of the organic light emitting device using a conjugated-system macromolecule, the patent reference 12 - 16 grades are mentioned.
[0008]
Thus, the latest advance in an organic light emitting device is remarkable, and the description has suggested the possibility from the versatility of high brightness and luminescence wavelength, high-speed responsibility, a thin shape, and the lightweight formation of a luminescence device being possible to an extensive application with low applied voltage.

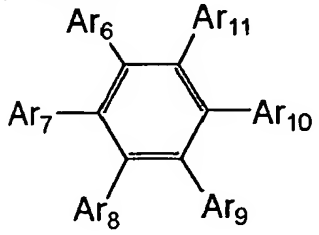
[0009]
However, the optical output or high conversion efficiency of the further high brightness is required of the actual condition. Moreover, there are still many problems in respect of endurance, such as degradation by an ambient atmosphere gas, moisture, etc. containing aging and oxygen by activity of long duration. Although luminescence of blue with the sufficient color purity at the time of furthermore considering the application to a full color display etc., green, and red is needed, still, it is not enough about these problems.
[0010]
As a fluorescence organic compound used for an electronic transporting bed, a luminous layer, etc., many aromatic compounds and condensed multi-ring aromatic compounds are studied. For example, although the patent reference 17-25 etc. is mentioned, what luminescence brightness and endurance can fully satisfy is not obtained.
[0011]
[Patent reference 1] U.S. Pat. No. 4,539,507 number description
[Patent reference 2] U.S. Pat. No. 4,720,432 number description
[Patent reference 3] U.S. Pat. No. 4,885,211 number description
[Patent reference 4] U.S. Pat. No. 5,151,629 number description
[Patent reference 5] U.S. Pat. No. 5,409,783 number description
[Patent reference 6] U.S. Pat. No. 5,382,477 number description
[Patent reference 7] JP,2-247278,A
[Patent reference 8] JP,3-255190,A
[Patent reference 9] JP,5-202356,A
[Patent reference 10] JP,9-202878,A
[Patent reference 11] JP,9-227576,A
[Patent reference 12] U.S. Pat. No. 5,247,190 number description
[Patent reference 13] U.S. Pat. No. 5,514,878 number description
[Patent reference 14] U.S. Pat. No. 5,672,678 number description
[Patent reference 15] JP,4-145192,A
[Patent reference 16] JP,5-247460,A
[Patent reference 17] JP,4-68076,A
[Patent reference 18] JP,5-32966,A
[Patent reference 19] JP,6-228552,A
[Patent reference 20] JP,6-240244,A
[Patent reference 21] JP,7-109454,A
[Patent reference 22] JP,8-311442,A
[Patent reference 23] JP,9-241629,A
[Patent reference 24] JP,2000-26334,A
[Patent reference 25] JP,2000-268964,A
[Nonpatent literature 1] Appl.Phys.Lett.51,913(1987)
[Nonpatent literature 2] Nature,395,151(1998
[Nonpatent literature 3] Nature,347,539(1990
[Description of the Invention]
[Problem(s) to be Solved by the Invention]
[0012]
The object of this invention is to offer a new condensed multi-ring compound.
[0013]
moreover, a condensed multi-ring compound [**** / the object of this invention] -- using -- very -- efficient -- high -- it is in offering the organic light emitting device which has a brightness optical output.
[0014]
Moreover, it is in offering an extremely durable organic light emitting device.
[0015]
It is in offering the organic light emitting device which manufacture can furthermore create comparatively cheaply

easily.
[Means for Solving the Problem]
[0016]
That is, the condensed multi-ring compound of this invention is characterized by what is shown by the following general formula [I] or [II].
[0017]
[Formula 1]



[I]

[0018]
(R1 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, a cyano group, or a halogen atom.) Ar1-Ar5 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or], and even if the same, they may differ.
[0019]
[Formula 2]



[I I]

[0020]
(Among the formula, Ar6-Ar11 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or], and even if the same, they may differ.)
[0021]
Moreover, in the organic light emitting device which has at least a layer containing the electrode of a couple with which the organic light emitting device of this invention consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this couple], at least one layer of the layers containing said organic compound is characterized by the thing of the above-mentioned condensed multi-ring compound for which a kind is contained at least.
[Effect of the Invention]
[0022]
applied voltage with the organic low light emitting device using the condensed multi-ring compound shown by the general formula [I] or the general formula [II] -- high -- brightness luminescence is obtained and it excels also in endurance. The organic layer containing especially the condensed multi-ring compound of this invention is excellent as an electronic transporting bed, and excellent also as a luminous layer.
[0023]

Furthermore, it can create using vacuum deposition or the casting method, and creation of a component is also comparatively cheap and can create the component of a large area easily.

[Best Mode of Carrying Out the Invention]

[0024]

Hereafter, this invention is explained to a detail.

[0025]

First, the condensed multi-ring compound of this invention is explained.

[0026]

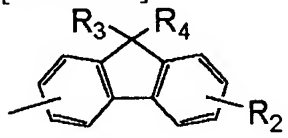
The condensed multi-ring compound of this invention is shown by the above-mentioned general formula [I] or [II].

[0027]

It is desirable that at least one or at least 1 of Ar6-Ar11 of Ar1-Ar5 are the condensed multi-ring aromatic series radical shown by the following general formula [III] here.

[0028]

[Formula 3]



[I I I]

[0029]

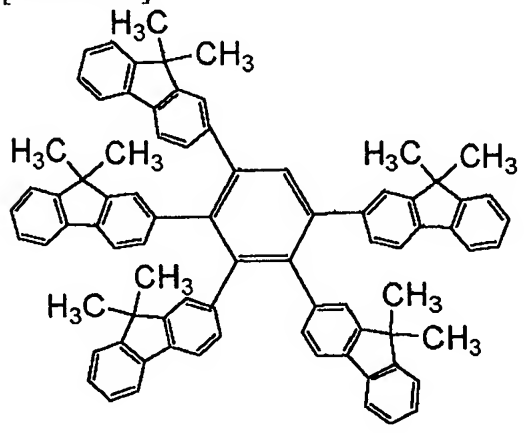
(R2 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, a cyano group, or a halogen atom.) R3 and R4 express the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], and even if the same, they may differ.

[0030]

Furthermore, it is more desirable to be shown with one of the following structure expressions.

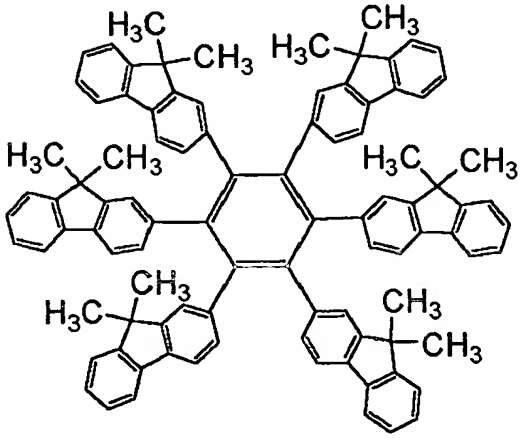
[0031]

[Formula 4]

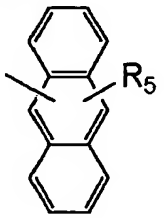


[0032]

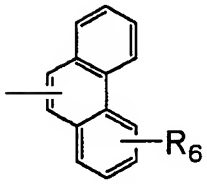
[Formula 5]



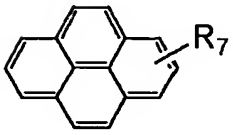
[0033]
Moreover, it is desirable that at least one or at least 1 of Ar6-Ar11 of Ar1-Ar5 are the condensed multi-ring aromatic series radical shown by either following general formula [IV] - [VII].
[0034]
[Formula 6]



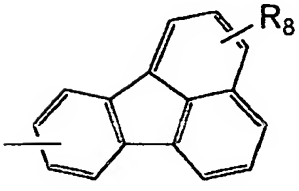
[IV]



[V]

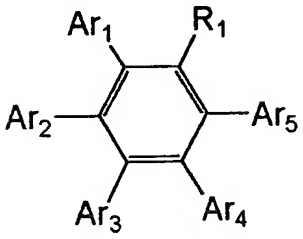


[VI]



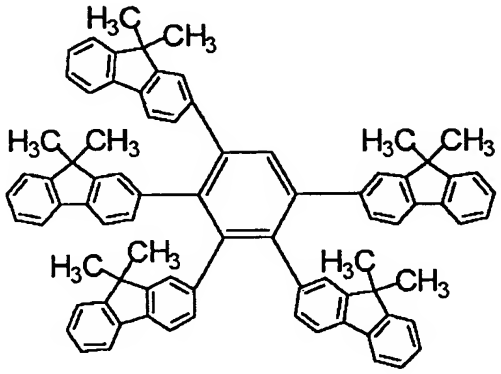
[VII]

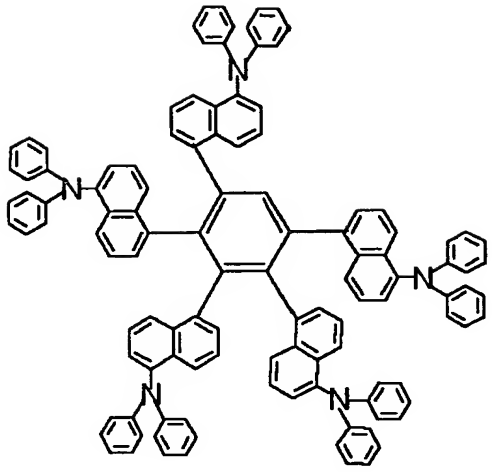
[0035]
(R5-R8 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, a cyano group, or a halogen atom.)
[0036]
The example of the substituent in the above-mentioned general formula [I] - [VII] is shown below.
[0037]
As an alkyl group, a methyl group, an ethyl group, n-propyl group, an iso-propyl group, n-butyl, ter-butyl, an octyl radical, etc. are mentioned.
[0038]
Benzyl, a phenethyl radical, etc. are mentioned as an aralkyl radical.
[0039]
As an aryl group, a phenyl group, a biphenyl radical, a terphenyl radical, etc. are mentioned.
[0040]
As a heterocycle radical, a thienyl group, a pyrrolyl radical, a pyridyl radical, an oxazolyl radical, an oxadiazolyl radical, a thiazolyl radical, a thiadiazolyl radical, a TACHI enyl radical, etc. are mentioned.
[0041]
As a permutation amino group, a dimethylamino radical, a diethylamino radical, a dibenzylamino radical, a diphenylamino radical, a ditolylamino radical, the JIANISORIRU amino group, etc. are mentioned.
[0042]
A fluorine, chlorine, a bromine, iodine, etc. are mentioned as a halogen atom.
[0043]
As a condensed multi-ring aromatic series radical, a fluorenyl group, a naphthyl group, a fluoran thenyl radical, an anthryl radical, a phenan thrill radical, a pyrenyl radical, a tetra-SENIRU radical, a pen TASENIRU radical, etc. are mentioned.
[0044]
As a condensed multi-ring heterocycle radical, a quinolyl radical, a diaza fluorenyl group, an acridinyl radical, a phenan trolley nil radical, etc. are mentioned.
[0045]
As a substituent which the above-mentioned substituent may have, alkyl groups, such as a methyl group, an ethyl group, and a propyl group, Aryl groups, such as aralkyl radicals, such as benzyl and a phenethyl radical, a phenyl group, and a biphenyl radical, Heterocycle radicals, such as a thienyl group, a pyrrolyl radical, and a pyridyl radical, a dimethylamino radical, A diethylamino radical, a dibenzylamino radical, a diphenylamino radical, a ditolylamino radical, Halogen atoms, such as alkoxyl groups, such as amino groups, such as a JIANISORIRU amino group, a methoxyl group, ethoxyl, propoxyl, and a phenoxyl radical, a cyano group, a fluorine, chlorine, a bromine, and iodine, etc. are mentioned.
[0046]
Next, although the example of representation of the condensed multi-ring compound of this invention is given to below, this invention is not limited to these.
[0047]
[Formula 7]

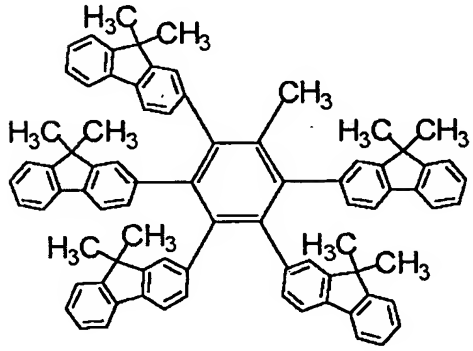


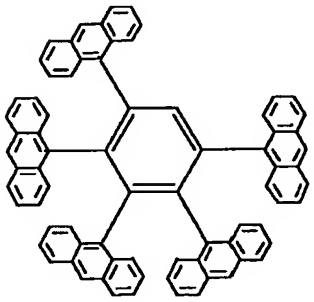
[I]

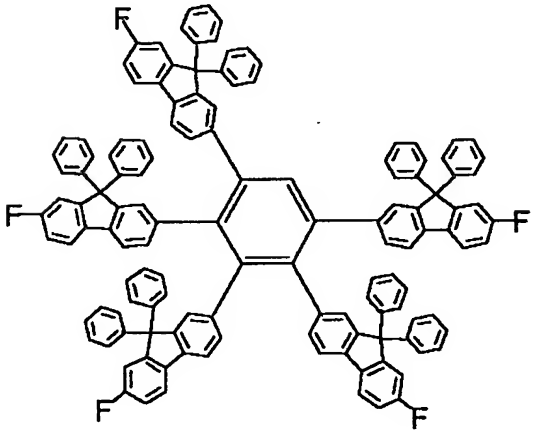
[0048]
[Formula 8]

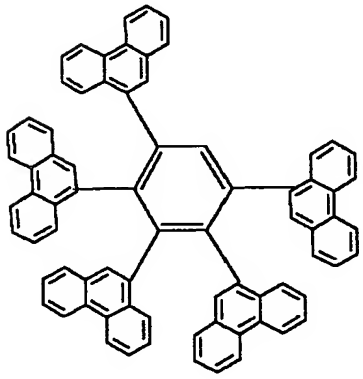
1 

4 

2 

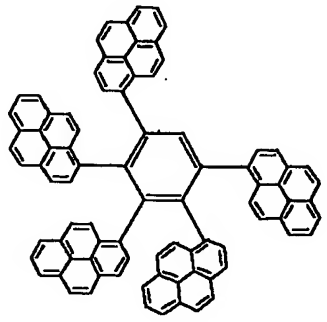
5 

3 

6 

[0049]
[Formula 9]

7



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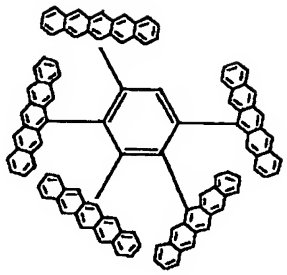

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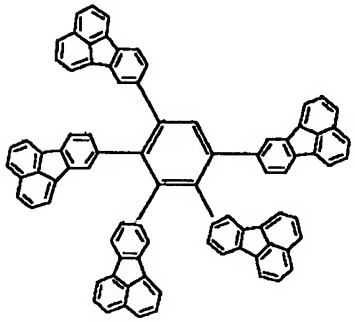

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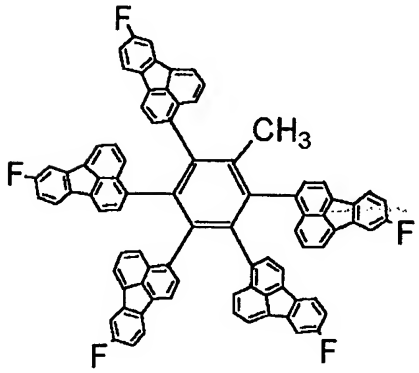
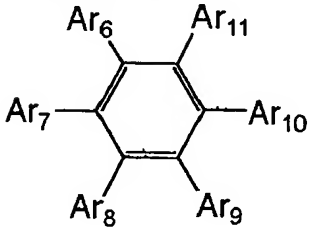


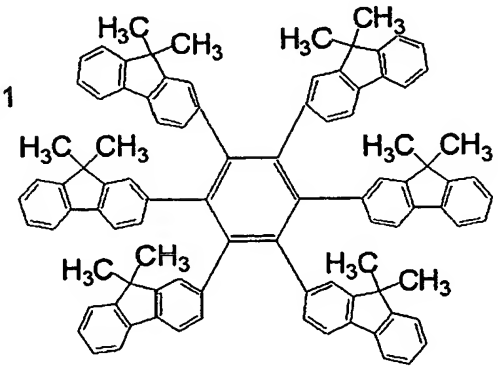
[0050]
[Formula 10]



[I I]

[0051]
[Formula 11]

11



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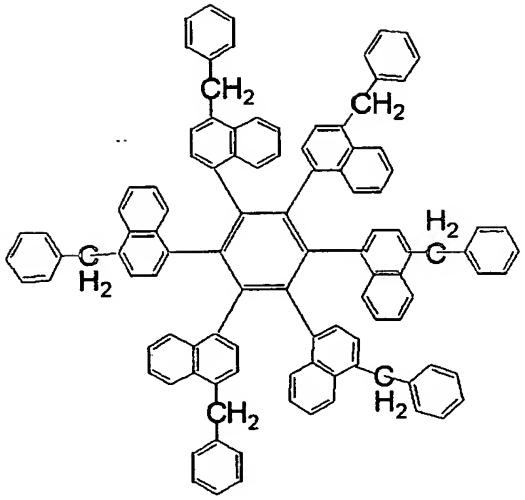

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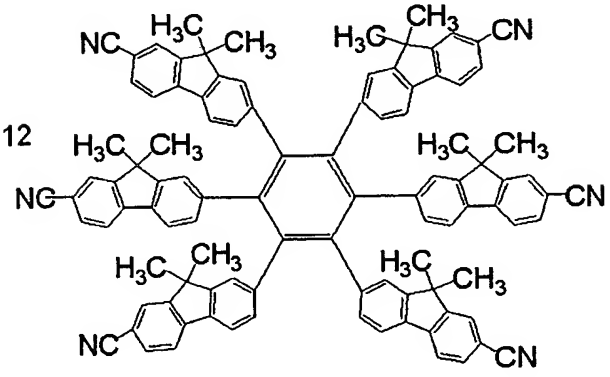

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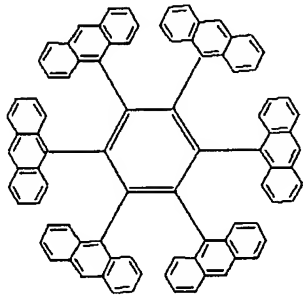

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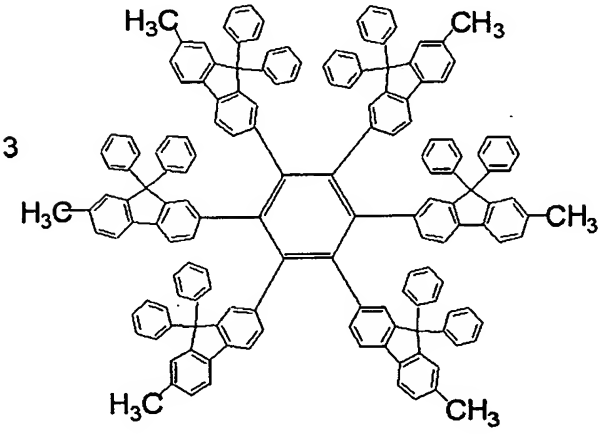

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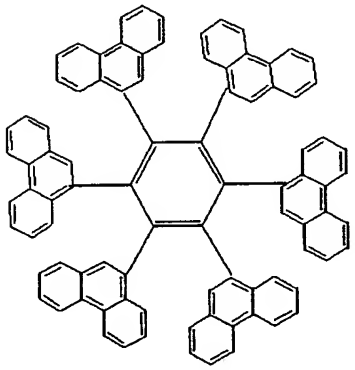
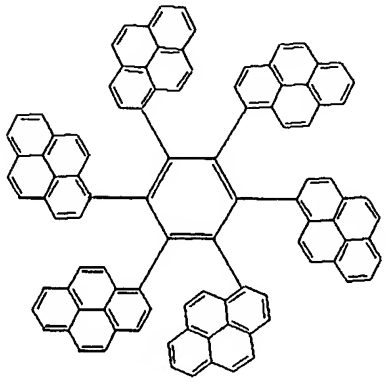


[0052]
[Formula 12]

17



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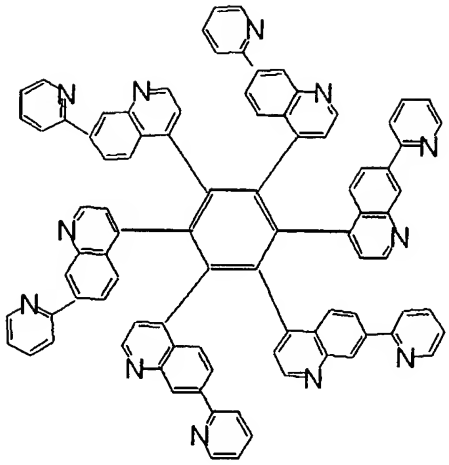

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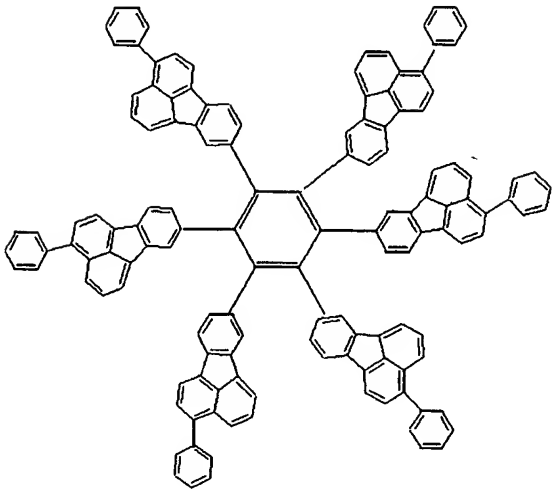

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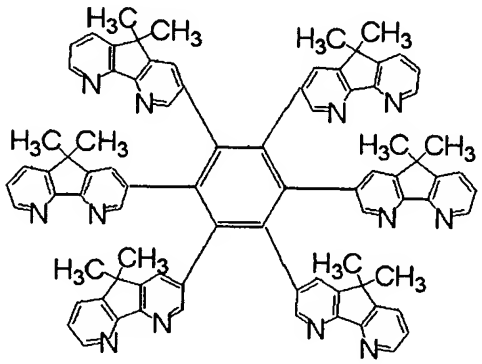

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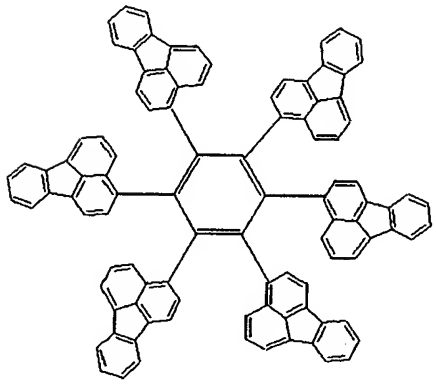

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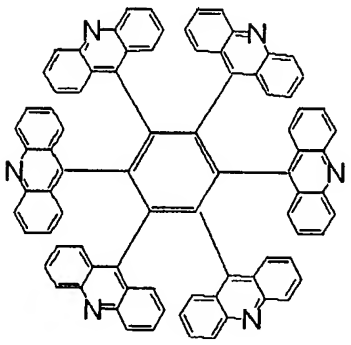


[0053]
suzuki coupling can compound the condensed multi-ring compound of this invention by the approach generally learned, for example, using the palladium catalyst -- Yamamoto using law (for example, Chem.Rev. 1995, 95, 2457 - 2483) and a nickel catalyst -- it can obtain with synthesis methods, such as law (2091 for example, Bull.Chem.Soc.Jpn.51, 1978) and the approach (for example, J.Org.Chem., 52, 4296, 1987) of compounding using an aryl tin compound.
[0054]
The condensed multi-ring compound of this invention is a compound which was excellent in electronic transportability, the luminescence, and endurance compared with the conventional compound, it is useful as an electronic transporting

bed and a luminous layer especially, and the layer containing the organic compound of an organic light emitting device and the layer formed by the vacuum deposition method, the solution applying method, etc. are [that crystallization etc. cannot take place easily] excellent in stability with the passage of time.

[0055]

Next, the organic light emitting device of this invention is explained to a detail.

[0056]

In the organic light emitting device which has at least a layer containing the electrode of a couple which consists of an anode plate and cathode, and 1 or two or more organic compounds which were ****(ed) by inter-electrode [of this couple], the organic light emitting device of this invention contains a kind, even if there are few condensed multi-ring compounds in which at least one layer of the layers containing said organic compound is shown by the above-mentioned general formula [I] or the general formula [II].

[0057]

The organic light emitting device of this invention has at least the desirable thing of said condensed multi-ring compound for which an electronic transporting bed or a luminous layer contains a kind at least among the layers containing an organic compound.

[0058]

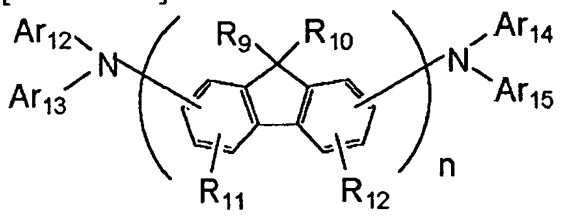
In the organic light emitting device of this invention, the condensed multi-ring compound shown by the above-mentioned general formula [I] or the general formula [II] is formed between an anode plate and cathode by the vacuum deposition method or the solution applying method. The thickness of the organic layer is thinner than 10 micrometers, and it is preferably desirable to thin-film-ize in thickness of 0.01-0.5 micrometers more preferably 0.5 micrometers or less.

[0059]

Moreover, it includes at least that a luminous layer contains the fluorene compound of said condensed multi-ring compound indicated to be a kind by the following general formula [VIII] or [IX] at least as a desirable mode among the layers in which the organic light emitting device of this invention contains said organic compound.

[0060]

[Formula 13]

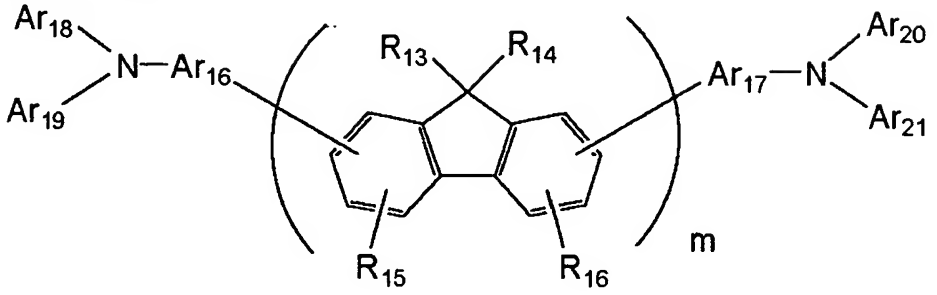


[V I I I]

[0061]

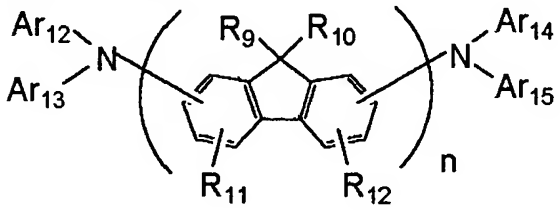
(Even if R9 and R10 which may differ from each other even if R9 comrades and R10 comrades which R9 and R10 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], and are combined with a different fluorene radical are the same, and are combined with the same fluorene radical are the same, they may differ.) R11 and R12 express the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], a cyano group, or a halogen atom. Even if R11 and R12 which may differ from each other even if R11 comrades and R12 comrades which are combined with a different fluorene radical are the same, and are combined with the same fluorene radical are the same, they may differ. Ar12, Ar13, Ar14, and Ar15 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / the heterocycle radical which is not permuted / the aromatic series radical which is not permuted / a permutation or / a permutation, or / a permutation, or /, a permutation, or], and even if the same, they may differ. It may join together mutually and Ar12, and Ar13, Ar14 and Ar15 may form a ring. n expresses the integer of 1

thru/or 10.
[0062]
[Formula 14]



[I X]

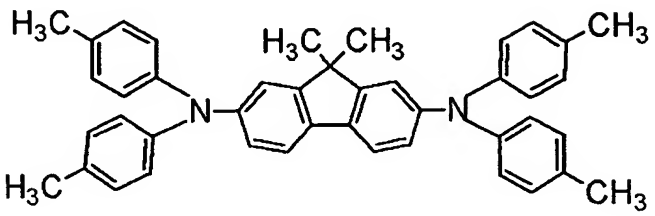
[0063]
(Even if R13 and R14 which may differ from each other even if R13 comrades and R14 comrades which R13 and R14 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], and are combined with a different fluorene radical are the same, and are combined with the same fluorene radical are the same, they may differ.) R15 and R16 express the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / the alkyl group which is not permuted / a hydrogen atom, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or], a cyano group, or a halogen atom. Even if R15 and R16 which may differ from each other even if R15 comrades and R16 comrades which are combined with a different fluorene radical are the same, and are combined with the same fluorene radical are the same, they may differ. Ar16 and Ar17 express the heterocycle radical which is not permuted [the aromatic series radical which is not permuted / a divalent permutation or /, a permutation, or], and even if the same, they may differ. Ar18, Ar19, Ar20, and Ar21 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / the heterocycle radical which is not permuted / the aromatic series radical which is not permuted / a permutation or / a permutation, or / a permutation, or /, a permutation, or], and even if the same, they may differ. It may join together mutually and Ar18, and Ar19, Ar20 and Ar21 may form a ring. m expresses the integer of 1 thru/or 10.
[0064]
The example of the substituent in a general formula [VIII] and [IX] is the same as that of the case in the above-mentioned general formula [I] - [VII]. Although the example of representation of the fluorene compound shown by the general formula [VIII] or [IX] is given to below, this invention is not limited to these.
[0065]
[Formula 15]



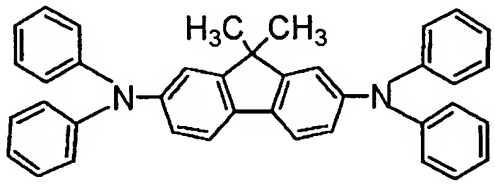
[V I I I]

[0066]
[Formula 16]

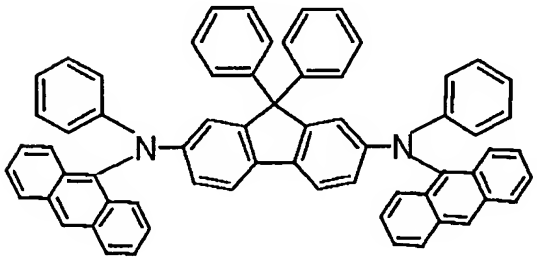
FL-1



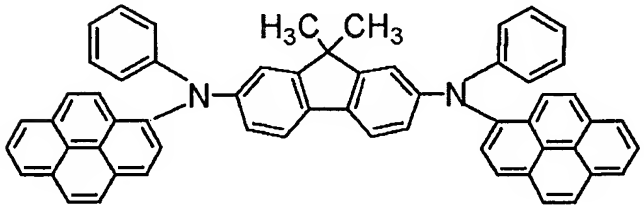
FL-2



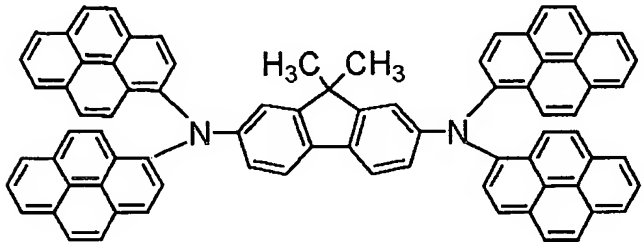
FL-3



FL-4

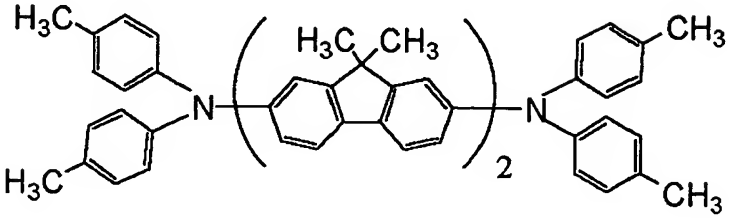


FL-5

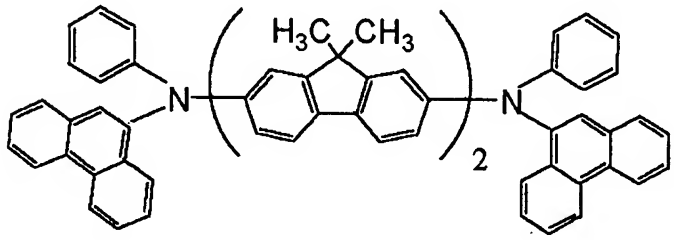


[0067]
[Formula 17]

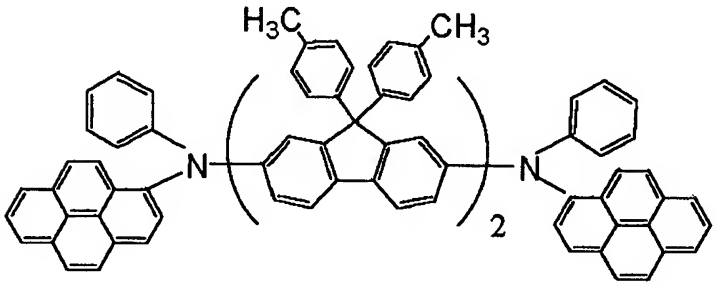
FL-6



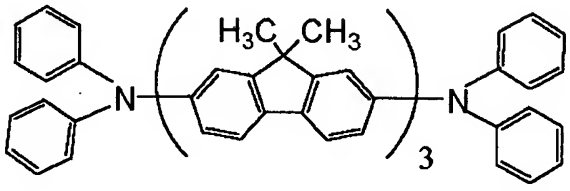
FL-7



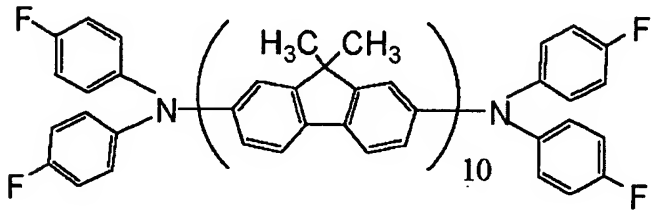
FL-8



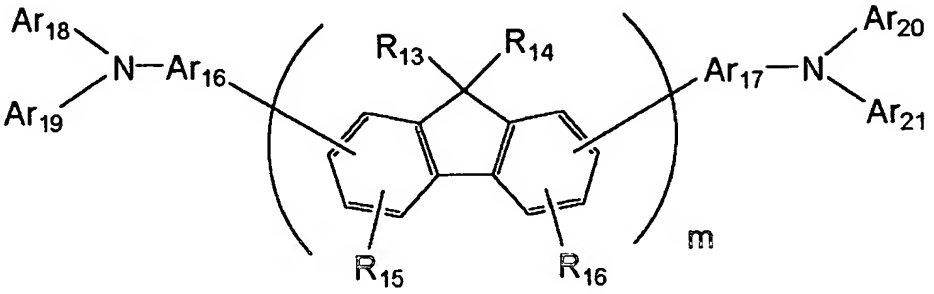
FL-9



FL-10



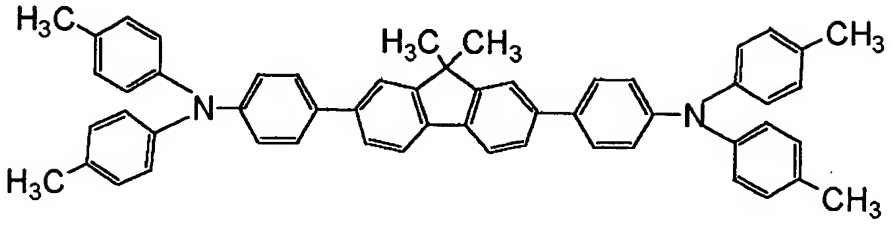
[0068]
[Formula 18]



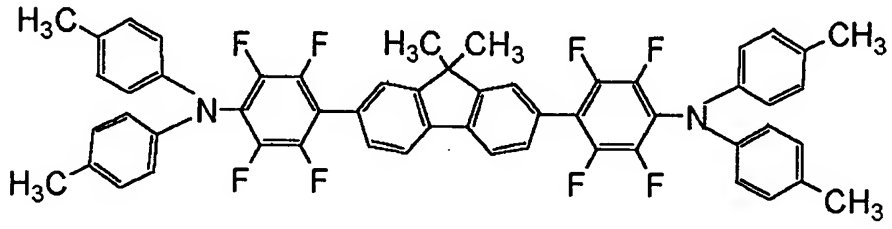
[IX]

[0069]
[Formula 19]

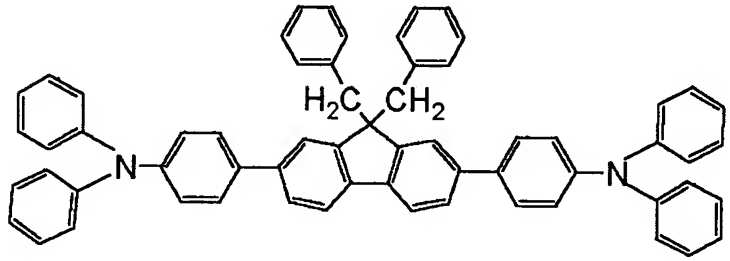
FL-11



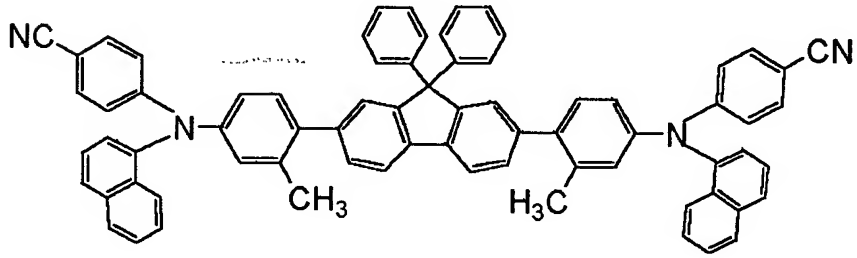
FL-12



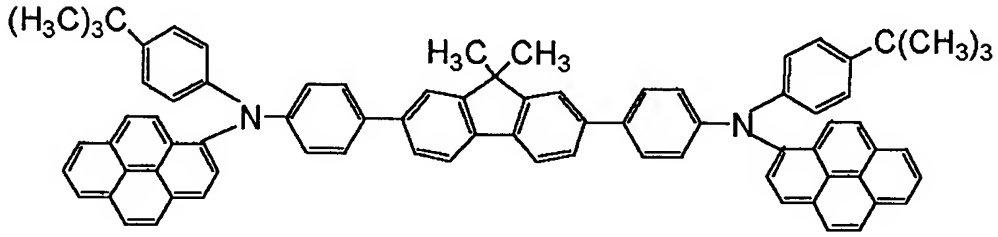
FL-13



FL-14

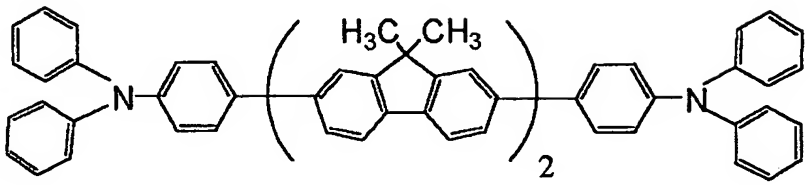


FL-15

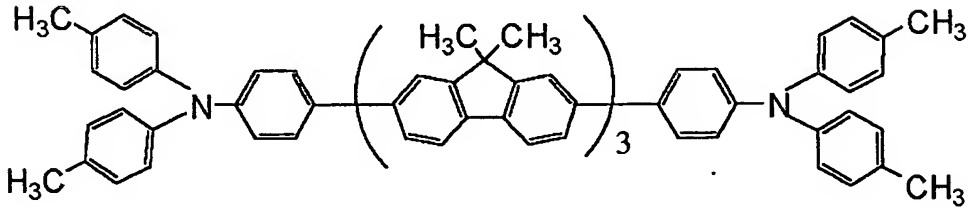


[0070]
[Formula 20]

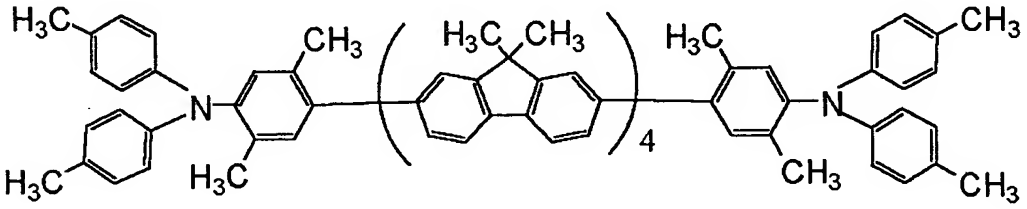
FL-16



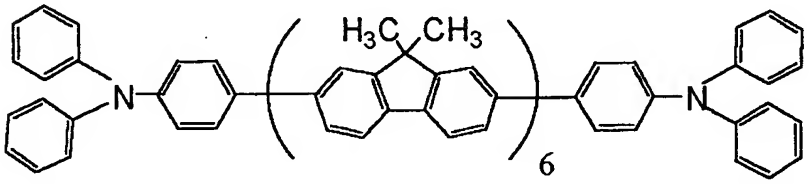
FL-17



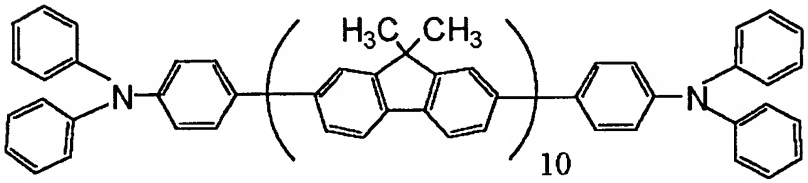
FL-18



FL-19



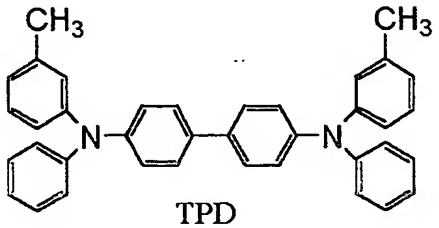
FL-20



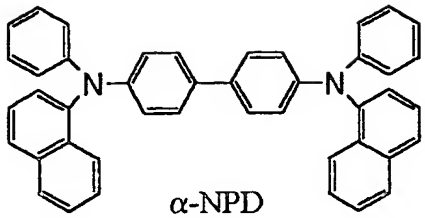
[0071]
An example with the organic desirable light emitting device of this invention is shown in drawing 1 - drawing 6 .
[0072]
Drawing 1 is the sectional view showing an example of the organic light emitting device of this invention. Drawing 1 is the thing of a configuration of having formed an anode plate 2, a luminous layer 3, and cathode 4 one by one on the substrate 1. The light emitting device used here is useful, when it is single and has hole transport ability, electron transport ability, and the luminescent engine performance by itself, or when mixing and using the compound which has each property.
[0073]

Drawing 2 is the sectional view showing other examples in the organic light emitting device of this invention. Drawing 2 is the thing of a configuration of having formed an anode plate 2, the hole transporting bed 5, the electronic transporting bed 6, and cathode 4 one by one on the substrate 1. in this case, photogene -- hole transportability -- or it is useful, when using for each layer the ingredient which has either of the electronic transportability, or both functions and using combining the mere hole transport matter or the electronic transport matter without the luminescence. Moreover, a luminous layer 3 consists in this case of either the hole transporting bed 5 or the electronic transporting bed 6.
[0074]
Drawing 3 is the sectional view showing other examples in the organic light emitting device of this invention. Drawing 3 is the thing of a configuration of having formed an anode plate 2, the hole transporting bed 5, a luminous layer 3, the electronic transporting bed 6, and cathode 4 one by one on the substrate 1. Since the various compounds which differ in luminescence wavelength can be used while this separating the function of carrier transport and luminescence, and combining it hole transportability, electronic transportability, a compound with each luminescent property, and timely, using it and the degree of freedom of ingredient selection increasing extremely, diversification of a luminescent color phase is attained. Furthermore, it also becomes possible to confine each carrier or an exciton in the central luminous layer 3 effectively, and to aim at improvement in luminous efficiency.
[0075]
Drawing 4 is the sectional view showing other examples in the organic light emitting device of this invention. It is the configuration which inserted the hole impregnation layer 7 in the anode plate 2 side to drawing 3 , and drawing 4 has effectiveness in the adhesion improvement of an anode plate 2 and the hole transporting bed 5, or an injectional improvement of a hole, and is effective for low-battery-izing.
[0076]
Drawing 5 and drawing 6 are the sectional views showing other examples in the organic light emitting device of this invention. Drawing 5 and drawing 6 are the configurations which inserted the layer (hole blocking layer 8) which checks escaping from a hole or an exciton (exciton) to a cathode 4 side to drawing 3 and drawing 4 between the luminous layer 3 and the electronic transporting bed 6. By using the very high compound of ionization potential as a hole blocking layer 8, it is a configuration effective for improvement in luminous efficiency.
[0077]
However, drawing 1 - drawing 6 are to the last very fundamental component configurations, and the configuration of the organic light emitting device using the compound of this invention is not limited to these. For example, various lamination -- the hole transporting bed which prepares the glue line or interference layer which prepares an insulating layer in an electrode and an organic layer interface consists of two-layer [from which ionization potential differs] -- can be taken.
[0078]
The condensed multi-ring compound shown by the general formula [I] or general formula [II] used for this invention is a compound which was excellent in electronic transportability, the luminescence, and endurance compared with the conventional compound, and can be used with any gestalt of drawing 1 - drawing 6 .
[0079]
Although the condensed multi-ring compound shown by the general formula [I] or the general formula [II] as a constituent of an electronic transporting bed or a luminous layer is used for this invention, a hole transportability compound, a luminescent compound, or an electronic transportability compound known until now can also be used for it together if needed.
[0080]
These examples of a compound are given to below.
[0081]
[Formula 21]

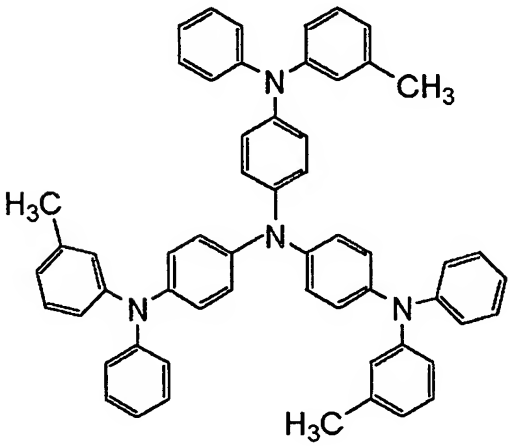
ホール輸送性化合物



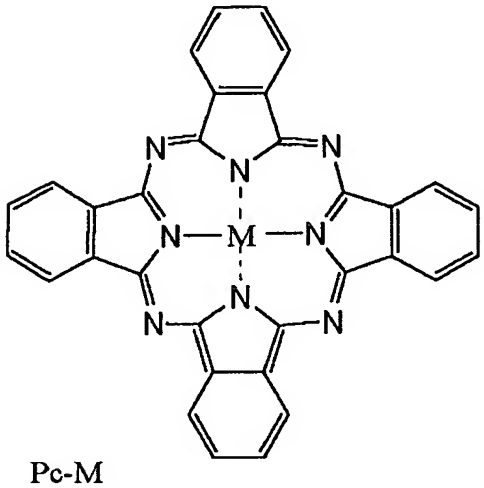
TPD



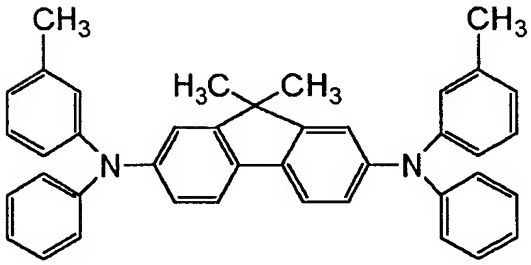
α-NPD



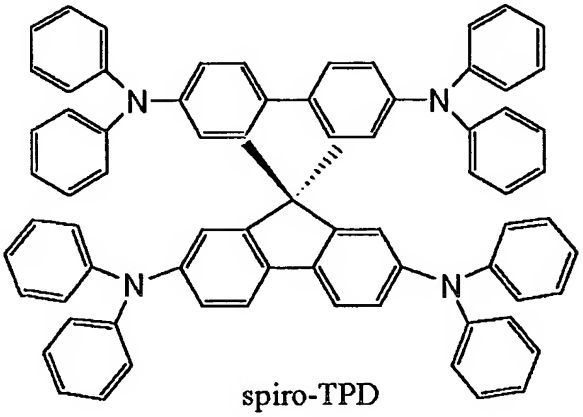
m-MTDATA



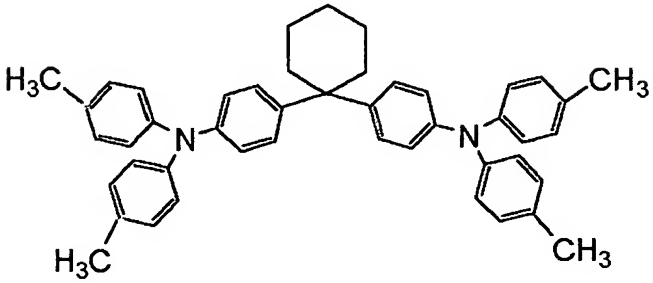
Pc-M
M : Cu, Mg, AlCl, TiO, $SiCl_2$, Zn , Sn, MnCl, GaCl, etc



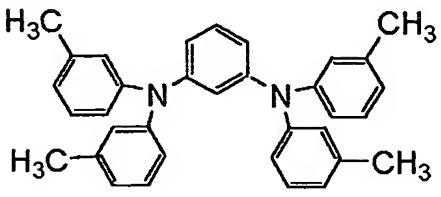
DTDPFL



spiro-TPD



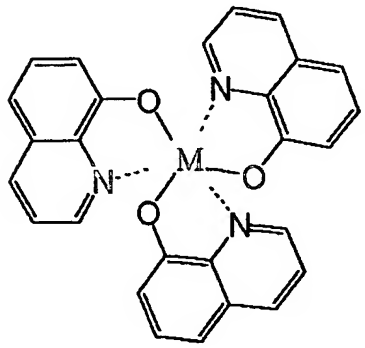
TPAC



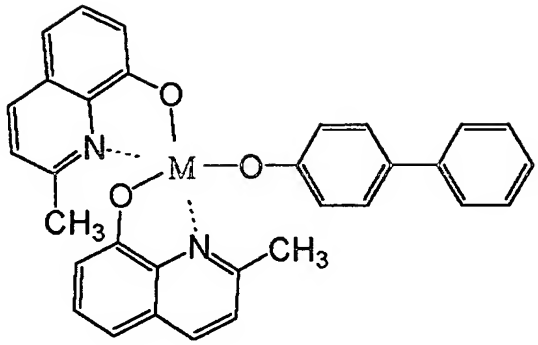
PDA

[0082]
[Formula 22]

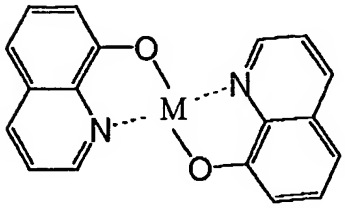
電子輸送性発光材料



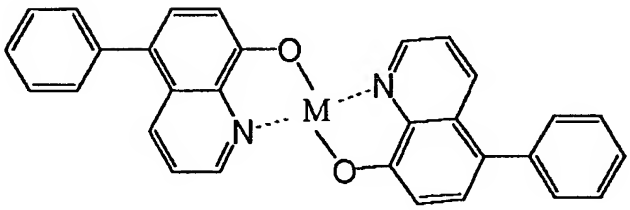
M : Al , Ga



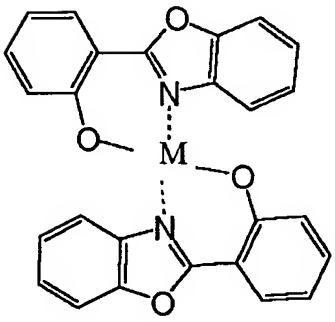
M : Al , Ga



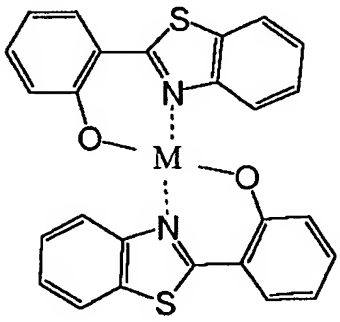
M : Zn , Mg , Be



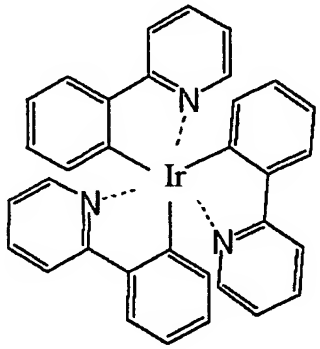
M : Zn , Mg , Be

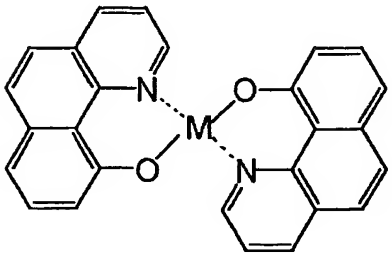


M : Zn , Mg , Be

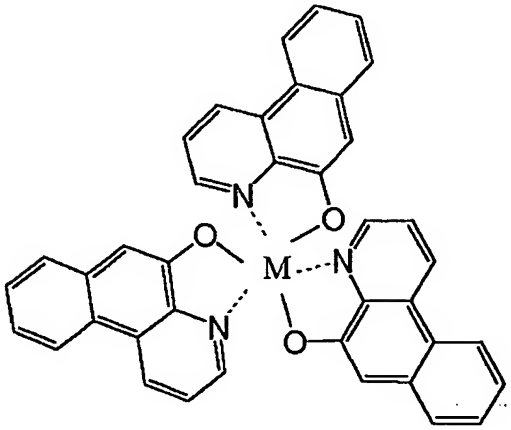


M : Zn , Mg , Be



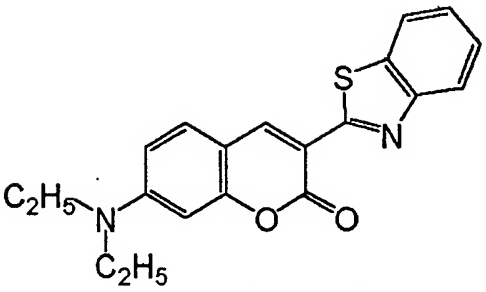


M : Zn , Mg , Be

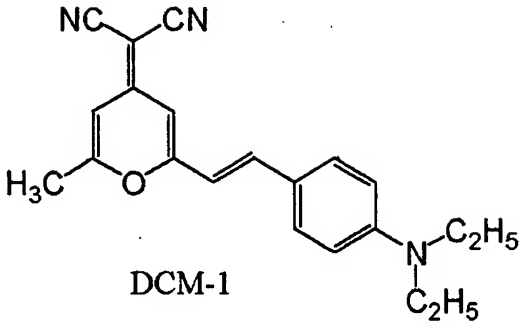


M : Al , Ga

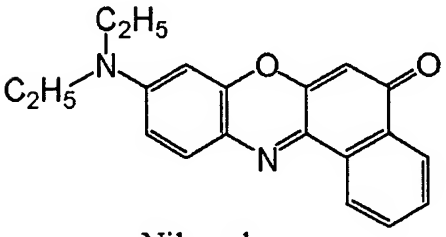
[0083]
[Formula 23]
発光材料



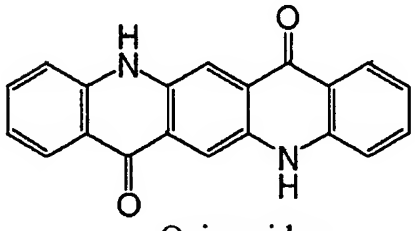
Coumarin6



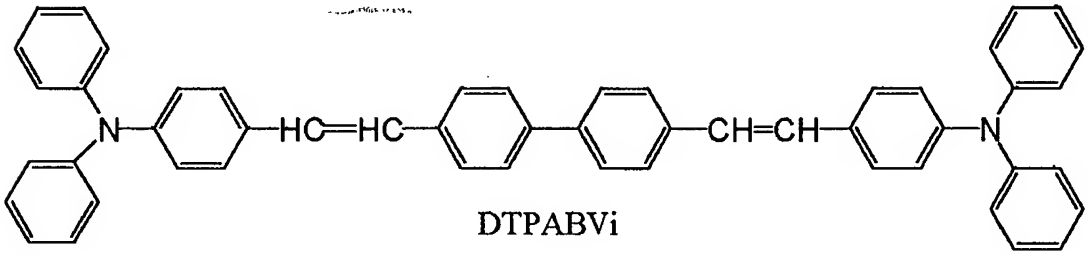
DCM-1



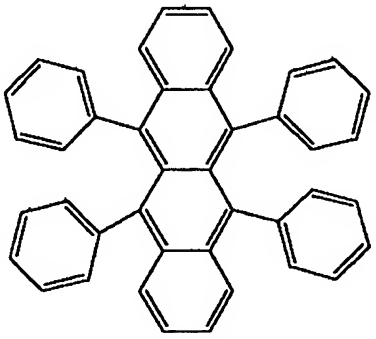
Nile red



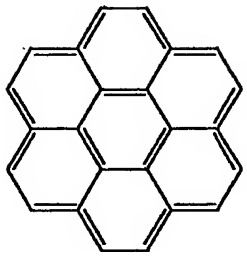
Quinacridone



DTPABVi



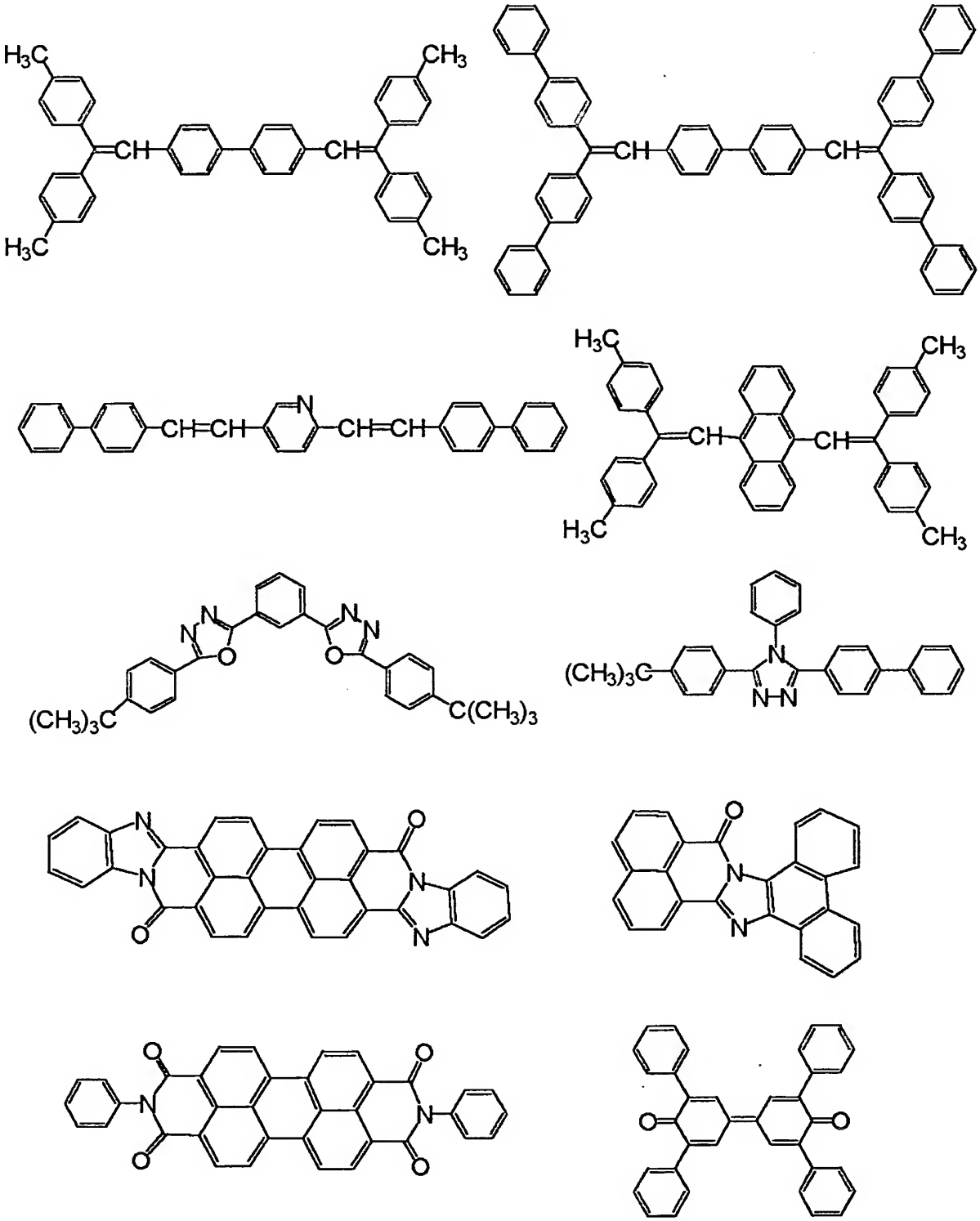
Rubrene



Coronene

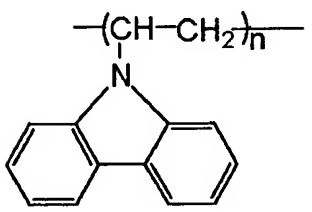
[0084]
[Formula 24]

発光層マトリックス材料および電子輸送材料

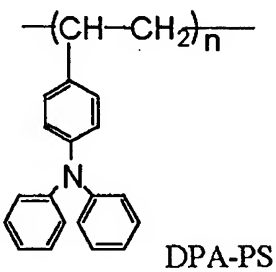


[0085]
[Formula 25]

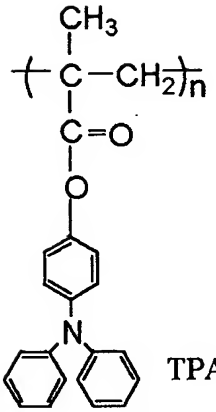
ポリマー系ホール輸送性材料



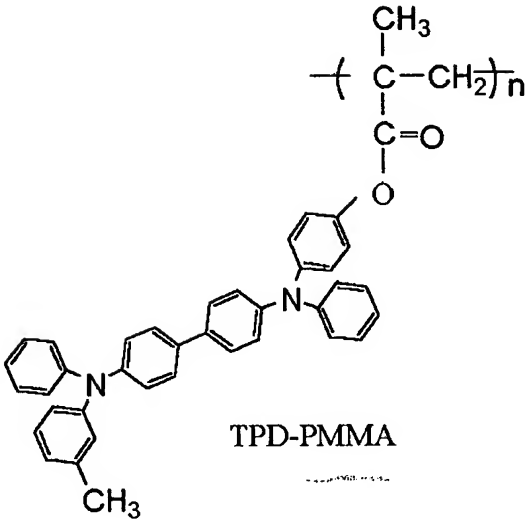
PVCz



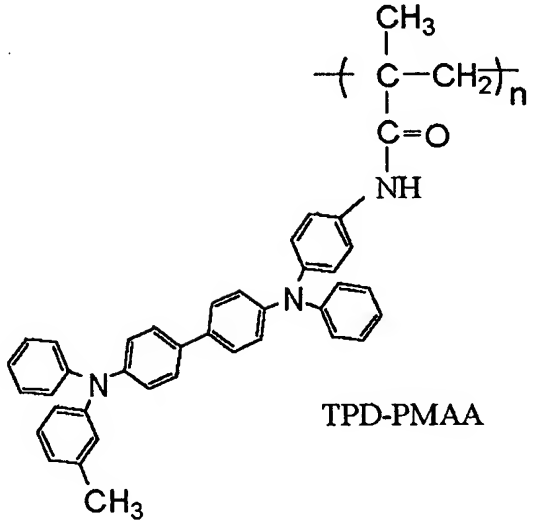
DPA-PS



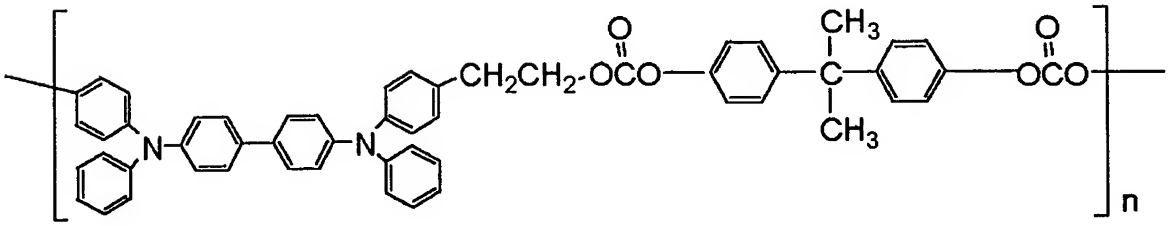
TPA-PMMA



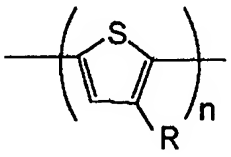
TPD-PMMA



TPD-PMAA

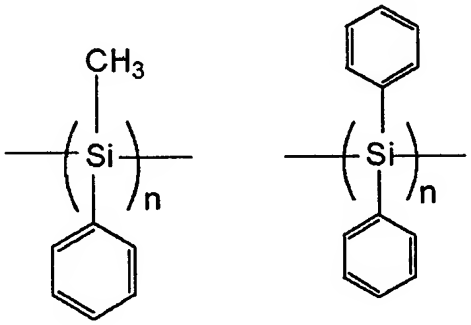


TPD-PCA



R:C_6H_{13},C_8H_{17},$C_{12}H_{25}$

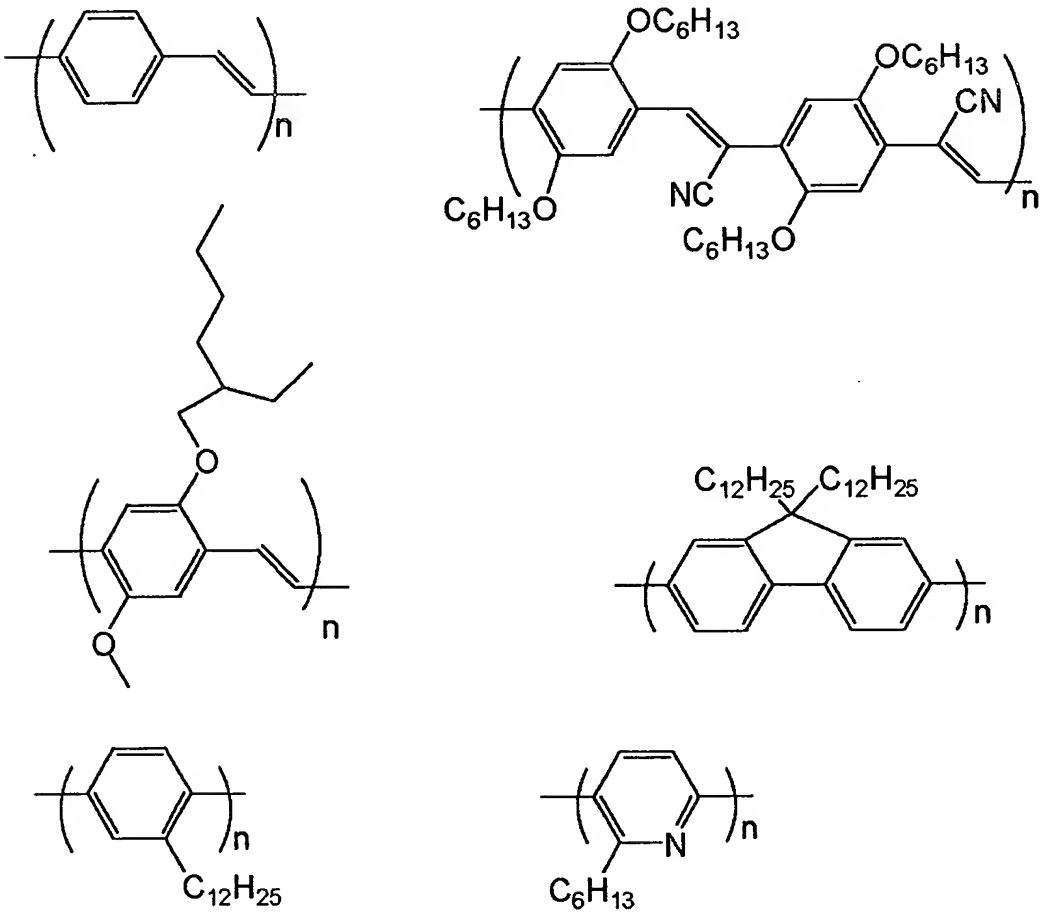
Poly thiophene



Polysilane

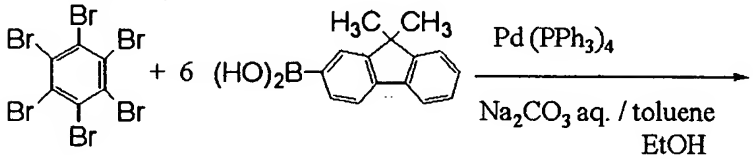
[0086]

[Formula 26]
ポリマー系発光材料および電荷輸送性材料

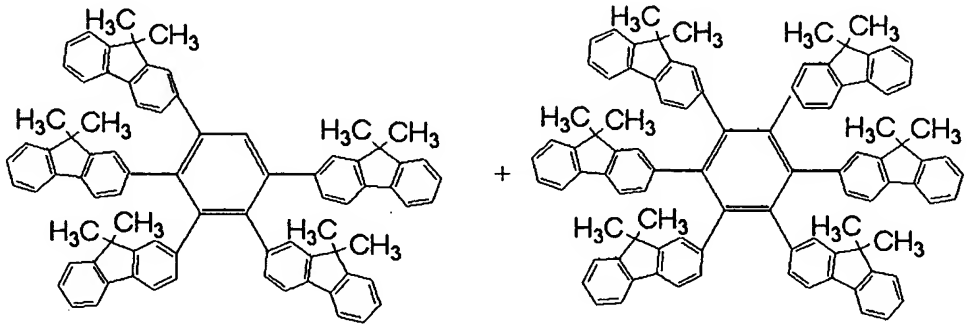


[0087]
In the organic light emitting device of this invention, generally, it is made to dissolve in a vacuum deposition method or a suitable solvent, and the layer containing the layer containing the condensed multi-ring compound shown by the general formula [I] or the general formula [II] and other organic compounds forms a thin film by the applying method. When forming membranes especially by the applying method, the film can also be formed combining suitable binding resin.
[0088]
Although it can choose from wide range bending resin as the above-mentioned binding resin, for example, polyvinyl-carbazole resin, polycarbonate resin, polyester resin, polyarylate resin, polystyrene resin, acrylic resin, methacrylic resin, butyral resin, polyvinyl-acetal resin, diallyl phthalate resin, phenol resin, an epoxy resin, silicone resin, polysulfone resin, a urea-resin, etc. are mentioned, it is not limited to these. moreover -- as that these are independent or a copolymer polymer -- one sort -- or two or more sorts may be mixed.
[0089]
As an anode material, what has as big a work function as possible is good, for example, metallic oxides, such as metal simple substances, such as gold, platinum, nickel, palladium, cobalt, a selenium, and vanadium, or these alloys, tin oxide, a zinc oxide, a tin oxide indium (ITO), and a zinc oxide indium, can be used. Moreover, conductive polymers, such as the poly aniline, polypyrrole, the poly thiophene, and a polyphenylene sulfide, can also be used. Such electrode

material may be used independently and can also be used together. [two or more]
[0090]
On the other hand, as a cathode material, the small thing of a work function is good and can use as a metal simple substance or two or more alloys, such as a lithium, sodium, a potassium, calcium, magnesium, aluminum, an indium, silver, lead, tin, and chromium. Utilization of metallic oxides, such as a tin oxide indium (ITO), is also possible. Moreover, a configuration is much more sufficient as cathode, and it can also take a multilayer configuration.
[0091]
Especially as a substrate used by this invention, although it does not limit, transparency substrates, such as opaque substrates, such as a metal substrate and a substrate made from the ceramics, glass, a quartz, and a plastic sheet, are used. Moreover, it is also possible to use the light filter film, the fluorescence color conversion filter film, the dielectric reflective film, etc. for a substrate, and to control coloring light.
[0092]
In addition, to the created component, a protective layer or a closure layer can also be prepared in order to prevent contact with oxygen, moisture, etc. As a protective layer, a photo-setting resin etc. is mentioned to poly membranes, such as inorganic material film, such as a diamond thin film, a metallic oxide, and a metal nitride, a fluororesin, poly paraxylene, polyethylene, silicone resin, and polystyrene resin, and a pan. Moreover, glass, a gas impermeable film, a metal, etc. can be covered and packaging of the component itself can also be carried out with suitable closure resin.
[Example]
[0093]
Hereafter, although the example explains this invention still more concretely, this invention is not limited to these.
[0094]
<The synthetic example 1 [composition of instantiation compound No.1 and No.11]>
[0095]
[Formula 27]



[1] [2]



No.1 No.11

[0096]
500ml 3 Thu opening flask -- hexabromobenzene [1] -- 1.4g (2.54mmol), 9, 9-dimethyl fluorene-2-boron acid [2]6.0g (25.4mmol), toluene 160ml, and ethanol 80ml were put in, the water solution of 30g of sodium carbonates and 150ml of water was dropped under stirring at the room temperature among nitrogen-gas-atmosphere mind, and, subsequently tetrakis (triphenyl phosphine) palladium (0)0.9g (0.78mmol) was added. After stirring at a room temperature for 30

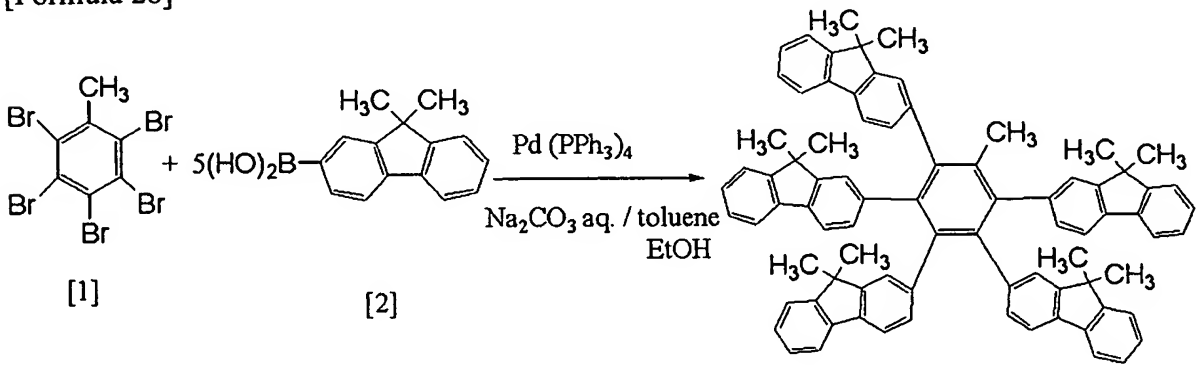
minutes, temperature up was carried out to 77 degrees, and it stirred for 20 hours. After the reaction, chloroform extracted the organic layer, anhydrous sodium sulfate refined with the silica gel column (hexane + toluene mixing expansion solvent) after desiccation, and instantiation compound No.1 (white crystal)0.44g (17% of yield) and No.11 (white crystal) 1.3g (42% of yield) were obtained.

[0097]

<The synthetic example 2 [composition of instantiation compound No.2]>

[0098]

[Formula 28]



[1] [2]

No.2

[0099]

In 300ml 3 Thu opening flask, 2, 3, 4, 5, 6-pen tableau mottle en [1]0.5g (1.03mmol), 9 9-dimethyl fluorene-2-boron acid [2]2.5g (10.3mmol), Toluene 100ml and ethanol 50ml were put in, the water solution of 10g of sodium carbonates and 50ml of water was dropped under stirring at the room temperature among nitrogen-gas-atmosphere mind, and, subsequently tetrakis (triphenyl phosphine) palladium (0)0.3g (0.26mmol) was added. After stirring at a room temperature for 30 minutes, temperature up was carried out to 77 degrees, and it stirred for 20 hours. After the reaction, chloroform extracted the organic layer, anhydrous sodium sulfate refined with the silica gel column (hexane + toluene mixing expansion solvent) after desiccation, and instantiation compound No.2 (white crystal)0.54g (55% of yield) was obtained.

[0100]

<Example 1>

The component of the structure shown in drawing 2 was created.

[0101]

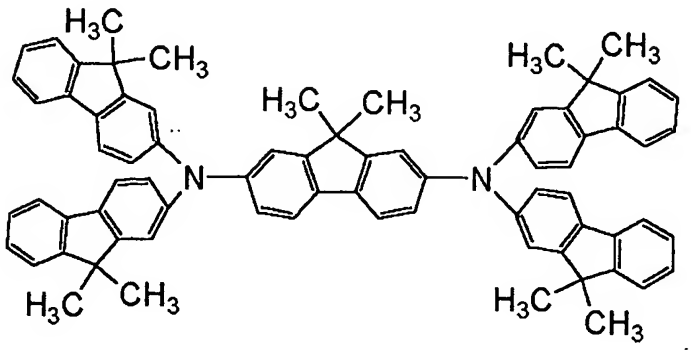
On the glass substrate as a substrate 1, what formed the tin oxide indium (ITO) as an anode plate 2 by 120nm thickness in the spatter was used as a transparent conductive support substrate. Sequential ultrasonic cleaning of this was carried out by the acetone and isopropyl alcohol (IPA), and, subsequently it dried after boiling washing by IPA. Furthermore, what carried out UV / ozone washing was used as a transparent conductive support substrate.

[0102]

On the transparent conductive support substrate, the chloroform solution of the compound shown with the following structure expression was formed by 30nm thickness with the spin coat method, and the hole transporting bed 5 was formed.

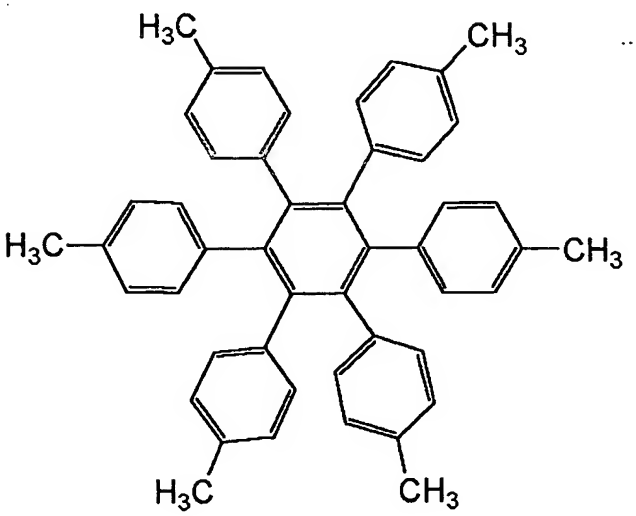
[0103]

[Formula 29]

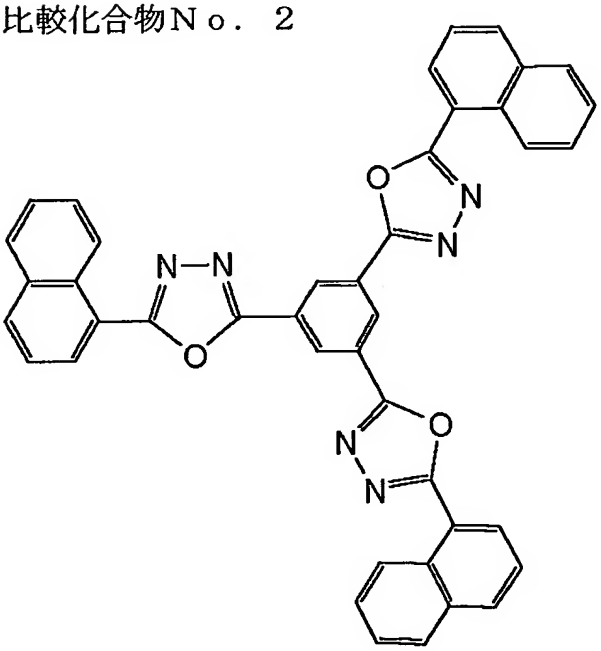


[0104]
The condensed multi-ring compound furthermore shown by instantiation compound No.11 was formed by 50nm thickness with the vacuum deposition method, and the electronic transporting bed 6 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0105]
Next, as cathode 4, using the vacuum evaporationo ingredient which consists of aluminum and a lithium (lithium concentration 1 atom %), the metal layer membrane with a thickness of 50nm was formed with the vacuum deposition method on the above-mentioned organic layer, and the aluminum layer with a thickness of 150nm was further formed with the vacuum deposition method. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 1.0 - 1.2 nm/sec.
[0106]
Furthermore, the glass plate for protection was put in nitrogen-gas-atmosphere mind, and it closed with the acrylic resin system binder.
[0107]
Thus, when the ITO electrode (anode plate 2) was used the obtained component, the positive electrode and the aluminum-Li electrode (cathode 4) were used as the negative electrode and the direct current voltage of 10V was impressed, the current flowed for the component with the current density of 12.0 mA/cm2, and blue luminescence was observed by the brightness of 2800 cd/m2.
[0108]
Furthermore, when 10.0mA /of current density was kept at 2 cm and the electrical potential difference was impressed for 100 hours, 100 hours after [initial brightness 2200 cd/m2] 2000 cd/m2 and brightness degradation were small.
[0109]
<Examples 2-10>
It replaced with instantiation compound No.11, and the instantiation compound shown in a table 1 was used, and also the component was created like the example 1, and same assessment was performed. A result is shown in a table 1.
[0110]
<The examples 1-5 of a comparison>
It replaced with instantiation compound No.11, and the compound shown with the following structure expression was used, and also the component was created like the example 1, and same assessment was performed. A result is shown in a table 1.
[0111]
[Formula 30]

比較化合物Ｎｏ．１

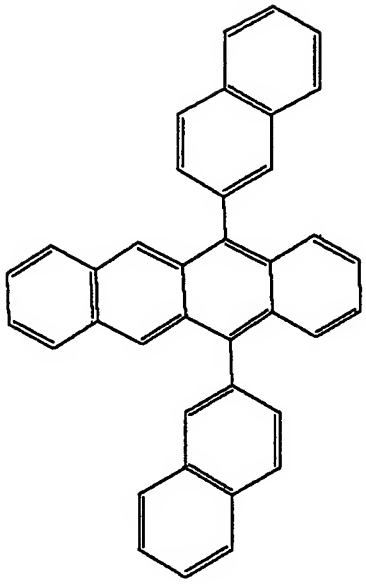


比較化合物Ｎｏ．２

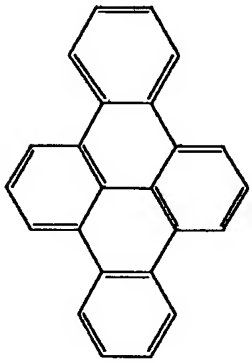


[0112]
[Formula 31]

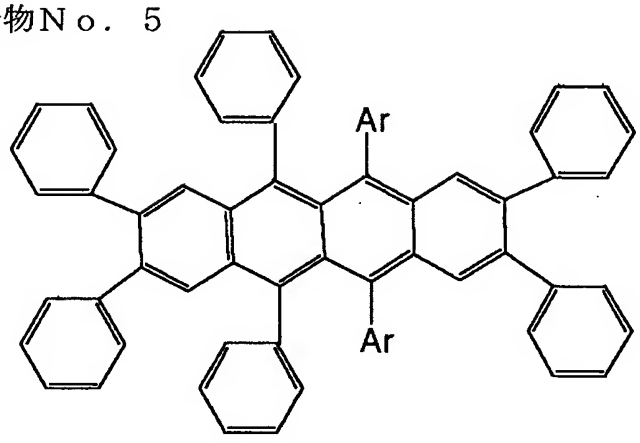
比較化合物Ｎｏ． 3



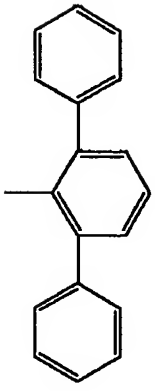
比較化合物Ｎｏ． 4



比較化合物Ｎｏ． 5



Ar:



[0113]
[A table 1]

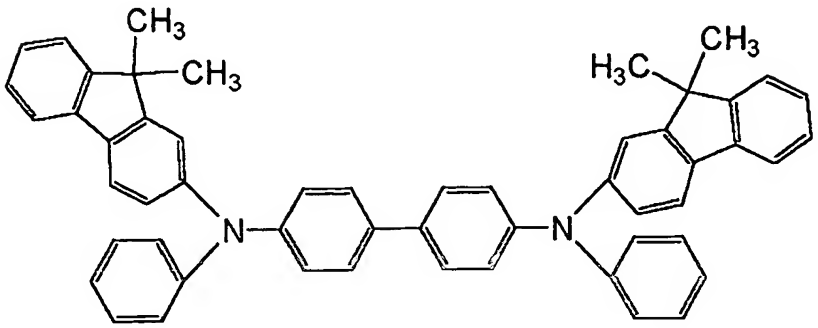
例 No.	例示化合物 No.	初期		耐久		
		印加電圧 (V)	輝度 (cd/m^2)	電流密度 (mA/cm^2)	初期輝度 (cd/m^2)	100 時間後輝度 (cd/m^2)
実施例 1	11	10	2800	10.0	2200	2000
2	1	10	2600	10.0	1900	1600
3	3	10	3000	10.0	2400	2000
4	6	10	1900	10.0	1400	1100
5	8	10	1800	10.0	1500	1300
6	9	10	2000	10.0	1500	1200
7	12	10	2400	10.0	1900	1500
8	14	10	950	10.0	800	700
9	17	10	1700	10.0	1400	1300
10	21	10	2200	10.0	1900	1500
比較例 1	比較 1	10	150	10.0	140	発光せず
2	比較 2	10	170	10.0	150	発光せず
3	比較 3	10	300	10.0	250	30
4	比較 4	10	250	10.0	240	90
5	比較 5	10	450	10.0	420	150

[0114]
<Example 11>
The component of the structure shown in drawing 3 was created.
[0115]
The hole transporting bed 5 was formed on the transparent conductive support substrate like the example 1.
[0116]
The condensed multi-ring compound furthermore shown by instantiation compound No.1 was formed by 20nm thickness with the vacuum deposition method, and the luminous layer 3 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0117]
Furthermore, aluminum tris quinolinol was formed by 40nm thickness with the vacuum deposition method, and the electronic transporting bed 6 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0118]
Next, it closed, after forming cathode 4 like an example 1.
[0119]
Thus, when the ITO electrode (anode plate 2) was used the obtained component, the positive electrode and the aluminum-Li electrode (cathode 4) were used as the negative electrode and the direct current voltage of 8V was impressed, the current flowed for the component with the current density of 14.0 mA/cm2, and blue luminescence was observed by the brightness of 5800 cd/m2.
[0120]
Furthermore, when 10.0mA /of current density was kept at 2 cm and the electrical potential difference was impressed for 100 hours, 100 hours after [initial brightness 4500 cd/m2] 4200 cd/m2 and brightness degradation were small.
[0121]

<Examples 12-20>
It replaced with instantiation compound No.1, and the instantiation compound shown in a table 2 was used, and also the component was created like the example 11, and same assessment was performed. A result is shown in a table 2.
[0122]
<The examples 6-10 of a comparison>
Replaced with instantiation compound No.1, and comparison compound No.1-5 were used, and also the component was created like the example 11, and same assessment was performed. A result is shown in a table 2.
[0123]
[A table 2]

例 No.	例示化合物 No.	初期		耐久		
		印加電圧 (V)	輝度 (cd/m^2)	電流密度 (mA/cm^2)	初期輝度 (cd/m^2)	100 時間後輝度 (cd/m^2)
実施例 11	1	8	5800	10.0	4500	4200
12	2	8	5300	10.0	4200	4000
13	4	8	2900	10.0	2200	2000
14	7	8	4200	10.0	3400	3200
15	10	8	3000	10.0	2400	2000
16	13	8	3100	10.0	2200	2000
17	15	8	3600	10.0	2800	2300
18	18	8	3700	10.0	2700	2500
19	20	8	2800	10.0	2400	2100
20	22	8	3200	10.0	2500	2200
比較例 6	比較 1	8	350	10.0	300	発光せず
7	比較 2	8	400	10.0	350	発光せず
8	比較 3	8	1000	10.0	850	100
9	比較 4	8	750	10.0	650	50
10	比較 5	8	1500	10.0	1100	350

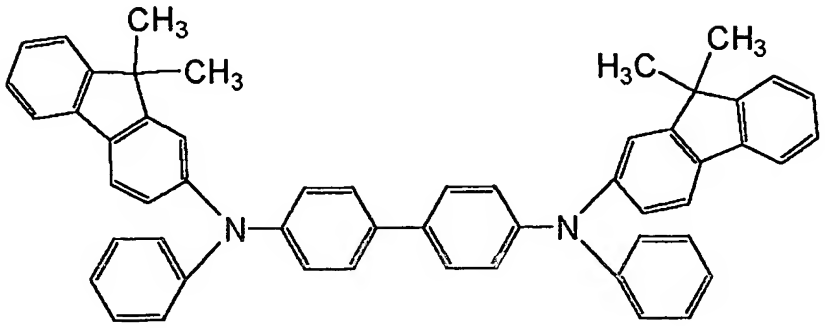
[0124]
<Example 21>
The component of the structure shown in drawing 3 was created.
[0125]
On the same transparent conductive support substrate as an example 1, the chloroform solution of the compound shown with the following structure expression was formed by 20nm thickness with the spin coat method, and the hole transporting bed 5 was formed.
[0126]
[Formula 32]



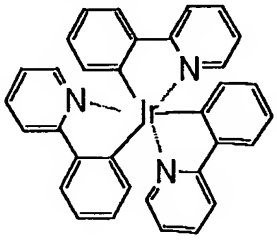
[0127]
The fluorene compound (weight ratio 100:1) shown by the condensed multi-ring compound furthermore shown by instantiation compound No.11 and instantiation compound No.floor line-6 was formed by 20nm thickness with the vacuum deposition method, and the luminous layer 3 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0128]
Furthermore, aluminum tris quinolinol was formed by 40nm thickness with the vacuum deposition method, and the electronic transporting bed 6 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0129]
Next, it closed, after forming cathode 4 like an example 1.
[0130]
Thus, when the ITO electrode (anode plate 2) was used the obtained component, the positive electrode and the aluminum-Li electrode (cathode 4) were used as the negative electrode and the direct current voltage of 8V was impressed, the current flowed for the component with the current density of 13.0 mA/cm2, and blue luminescence was observed by the brightness of 13000 cd/m2.
[0131]
Furthermore, when 10.0mA /of current density was kept at 2 cm and the electrical potential difference was impressed for 100 hours, 100 hours after [initial brightness 10000 cd/m2] 8900 cd/m2 and brightness degradation were small.
[0132]
<Examples 22-40>
It replaced with instantiation fluorene compound No.floor line-6, and the instantiation fluorene compound shown in a table 3 was used, and also the component was created like the example 21, and same assessment was performed. A result is shown in a table 3.
[0133]
<The examples 11-15 of a comparison>
Replaced with instantiation compound No.11, and comparison compound No.1-5 were used, and also the component was created like the example 21, and same assessment was performed. A result is shown in a table 3.
[0134]
[A table 3]

例 No.	例示化合物 No.	例示フルオレン化合物 No.	初期		耐久		
			印加電圧 (V)	輝度 (cd/m^2)	電流密度 (A/cm^2)	初期輝度 (cd/m^2)	100 時間後輝度 (cd/m^2)
実施例 21	11	FL−6	8	13000	10.0	10000	9000
22	11	FL−1	8	11000	10.0	8500	8000
23	11	FL−2	8	11000	10.0	8000	7000
24	11	FL−3	8	8500	10.0	7500	6500
25	11	FL−4	8	13000	10.0	9500	7500
26	11	FL−5	8	12000	10.0	9000	7000
27	11	FL−7	8	7000	10.0	6000	5500
28	11	FL−8	8	7500	10.0	6500	6000
29	11	FL−9	8	12000	10.0	10000	9000
30	11	FL−10	8	6500	10.0	6000	5500
31	11	FL−11	8	15000	10.0	12000	11000
32	11	FL−12	8	9000	10.0	8000	6500
33	11	FL−13	8	7000	10.0	6500	6000
34	11	FL−14	8	8000	10.0	6500	5500
35	11	FL−15	8	11000	10.0	9000	8000
36	11	FL−16	8	16000	10.0	13000	11000
37	11	FL−17	8	13000	10.0	11000	9500
38	11	FL−18	8	9500	10.0	8000	6500
39	11	FL−19	8	7500	10.0	6000	5000
40	11	FL−20	8	6500	10.0	6000	5000
比較例 11	比較 1	FL−6	8	2500	10.0	2000	300
12	比較 2	FL−6	8	2000	10.0	1500	発光せず
13	比較 3	FL−6	8	3000	10.0	2500	600
14	比較 4	FL−6	8	2500	10.0	2000	400
15	比較 5	FL−6	8	3500	10.0	3000	1000

[0135]
<Example 41>
The component of the structure shown in drawing 3 was created.
[0136]
On the same transparent conductive support substrate as an example 1, the chloroform solution of the compound shown with the following structure expression was formed by 20nm thickness with the spin coat method, and the hole transporting bed 5 was formed.
[0137]
[Formula 33]



[0138]
The compound (weight ratio 100:5) shown with the condensed multi-ring compound and the following structure expression which are furthermore shown by instantiation compound No.2 was formed by 20nm thickness with the vacuum deposition method, and the luminous layer 3 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0139]
[Formula 34]



[0140]
Furthermore, bathophenanthroline (BPhen) was formed by 40nm thickness with the vacuum deposition method, and the electronic transporting bed 6 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0141]
Next, it closed, after forming cathode 4 like an example 1.
[0142]
Thus, when the ITO electrode (anode plate 2) was used the obtained component, the positive electrode and the aluminum-Li electrode (cathode 4) were used as the negative electrode and the direct current voltage of 8V was impressed, the current flowed for the component with the current density of 9.5 mA/cm2, and green luminescence was observed by the brightness of 7000 cd/m2.
[0143]
Furthermore, when 7.0mA /of current density was kept at 2 cm and the electrical potential difference was impressed for 100 hours, 100 hours after [initial brightness 5000 cd/m2] 4500 cd/m2 and brightness degradation were small.
[0144]
<Examples 42-50>
It replaced with instantiation compound No.2, and the instantiation compound shown in a table 4 was used, and also the component was created like the example 41, and same assessment was performed. A result is shown in a table 4.
[0145]
<The examples 16-20 of a comparison>
Replaced with instantiation compound No.2, and comparison compound No.1-5 were used, and also the component was created like the example 41, and same assessment was performed. A result is shown in a table 4.
[0146]

[A table 4]

例 No.	例示化合物 No.	初期		耐久		
		印加電圧 (V)	輝度 (cd/m²)	電流密度 (mA/cm²)	初期輝度 (cd/m²)	100 時間後輝度 (cd/m²)
実施例 41	2	8	7000	7.0	5000	4500
42	3	8	6500	7.0	5000	4000
43	5	8	8000	7.0	6500	6000
44	6	8	7000	7.0	6000	5000
45	13	8	6000	7.0	5000	4500
46	15	8	8500	7.0	7500	6500
47	16	8	7000	7.0	6500	6000
48	19	8	4500	7.0	4000	3500
49	20	8	5000	7.0	4000	3000
50	22	8	6500	7.0	5500	4500
比較例 16	比較 1	8	900	7.0	800	100
17	比較 2	8	650	7.0	600	発光せず
18	比較 3	8	1500	7.0	1000	300
19	比較 4	8	1000	7.0	850	100
20	比較 5	8	2000	7.0	1500	550

[0147]
<Example 51>
The component of the structure shown in drawing 1 was created.
[0148]
On the same transparent conductive support substrate as an example 1, the solution which dissolved 0.050g and Polly N-vinylcarbazole (weight average molecular weight = 63,000) 1.00g for the condensed multi-ring compound shown by instantiation compound No.1 in chloroform 80ml was formed to 120nm thickness with the spin coat method (rotational frequency = 2000rpm), and the organic layer (luminous layer 3) was formed.
[0149]
Next, it closed, after forming cathode 4 like an example 1.
[0150]
Thus, when the ITO electrode (anode plate 2) was used the obtained component, the positive electrode and the aluminum-Li electrode (cathode 4) were used as the negative electrode and the direct current voltage of 10V was impressed, the current flowed for the component with the current density of 7.7 mA/cm2, and blue luminescence was observed by the brightness of 1400 cd/m2.
[0151]
Furthermore, when current density was maintained at 5.0 mA/cm2 under nitrogen-gas-atmosphere mind and the electrical potential difference was impressed for 100 hours, 900 cds/m2, and brightness degradation were small 100 hours after initial brightness 950 cd/m2.
[0152]
<Examples 52-55>
It replaced with instantiation compound No.1, and the instantiation compound shown in a table 5 was used, and also the component was created like the example 51, and same assessment was performed. A result is shown in a table 5.

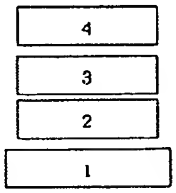
[0153]
<The examples 21-25 of a comparison>
Replaced with instantiation compound No.1, and comparison compound No.1-5 were used, and also the component was created like the example 51, and same assessment was performed. A result is shown in a table 5.
[0154]
[A table 5]

例 No.	例示化合物 No.	初期		耐久		
		印加電圧 (V)	輝度 (cd/m^2)	電流密度 (mA/cm^2)	初期輝度 (cd/m^2)	100 時間後輝度 (cd/m^2)
実施例 51	1	10	1400	5.0	950	900
52	2	10	1200	5.0	900	800
53	11	10	1500	5.0	1200	1100
54	17	10	1400	5.0	1000	950
55	19	10	1300	5.0	1000	850
比較例 21	比較 1	10	250	5.0	200	発光せず
22	比較 2	10	150	5.0	100	発光せず
23	比較 3	10	350	5.0	300	発光せず
24	比較 4	10	300	5.0	250	発光せず
25	比較 5	10	550	5.0	450	100

[Brief Description of the Drawings]
[0155]
[Drawing 1] It is the sectional view showing an example of the organic light emitting device in this invention.
[Drawing 2] It is the sectional view showing other examples of the organic light emitting device in this invention.
[Drawing 3] It is the sectional view showing other examples of the organic light emitting device in this invention.
[Drawing 4] It is the sectional view showing other examples of the organic light emitting device in this invention.
[Drawing 5] It is the sectional view showing other examples of the organic light emitting device in this invention.
[Drawing 6] It is the sectional view showing other examples of the organic light emitting device in this invention.
[Description of Notations]
[0156]
1 Substrate
2 Anode Plate
3 Luminous Layer
4 Cathode
5 Hole Transporting Bed
6 Electronic Transporting Bed
7 Hole Impregnation Layer
8 Hole / Exciton Blocking Layer

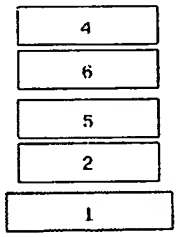
[Translation done.]

Drawing selection drawing 1



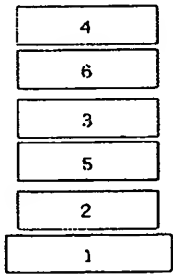
[Translation done.]

Drawing selection drawing 2



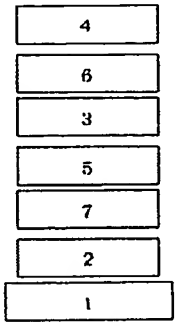
[Translation done.]

Drawing selection drawing 3



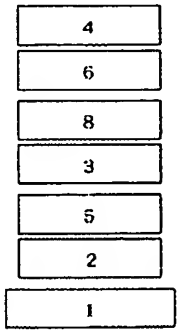
[Translation done.]

Drawing selection drawing 4



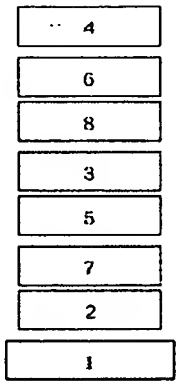
[Translation done.]

Drawing selection drawing 5



[Translation done.]

Drawing selection drawing 6



[Translation done.]